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Soviet Geography: Review and Translation

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This translation and publication project was undertaken by the American Geographical Society in the conviction that the dissemination of the fruits of Soviet geographic research would be a service to American geographers and would help bring about professional contacts between geographers of the two countries. The National Science Foundation encouraged the project and is supporting it by a grant.

Readers are invited to send in their comments and discussion of articles published in *Soviet Geography*. Readers are also encouraged to submit suggestions as to published Soviet geographic literature worthy of translation. Such suggestions should relate to articles of general substantive or methodological interest rather than materials of narrow, specialized appeal.

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TRANSLITERATION TABLE

Russian			English	Russian			English
А	а	*а*	a	Р	р	*р*	r
Б	б	*б*	b	С	с	*с*	s
В	в	*в*	v	Т	т	*т*	t
Г	г	*г*	g	У	у	*у*	u
Д	д	*д*	d	Ф	ф	*ф*	f
Е	е	*е*	e*	Х	х	*х*	kh
Ж	ж	*ж*	zh	Ц	ц	*ц*	ts
З	з	*з*	z	Ч	ч	*ч*	ch
И	и	*и*	i	Ш	ш	*ш*	sh
Й	й	*й*	y	Щ	щ	*щ*	shch
К	к	*к*	k	Ъ	ъ	*ъ*	"
Л	л	*л*	l	Ы	ы	*ы*	y
М	м	*м*	m	Ь	ь	*ь*	'
Н	н	*н*	n	Э	э	*э*	e
О	о	*о*	o	Ю	ю	*ю*	yu
П	п	*п*	p	Я	я	*я*	ya

(*) Instead of e, use ye at the beginning of names, after vowels and after the soft sign (').

The transliteration table is supplied for the general information of readers and to enable them to identify the geographic names on maps that will be reproduced from time to time in SOVIET GEOGRAPHY.

The transliteration system is the one proposed by the United States Board on Geographic Names. For more general use in textbooks and other popular needs, the following simplifications are recommended by the editor of SOVIET GEOGRAPHY:

1. Eliminate the use of (') and (").
2. Use i for iy, and y for yy.
3. Convert diphthongs ay, ey, oy, uy to ai, ei, oi, ui.

THE THIRD CONGRESS OF THE GEOGRAPHICAL SOCIETY OF THE USSR

(The following papers conclude the material presented in the Symposium on Economic Regionalization. Previous papers of that symposium were printed in SOVIET GEOGRAPHY, June, 1960, and September, 1960.)

PROBLEMS OF GENERAL ECONOMIC REGIONALIZATION AT THE PRESENT STAGE

By P. M. Alampiyev

General economic regionalization of the Soviet Union, meaning a scientifically justified division of the country into major economic regions, is of great importance for a planned development of the national economy. The 21st party congress pointed that out in its resolutions by stating: "The delimitation of major economic-geographic regions in planning makes possible a correct geographic distribution and the most economical territorial organization of the national economy of the Soviet Union."

Such an economical territorial organization of the national economy is the main objective of work on general economic regionalization, which is therefore of national importance.

General economic regionalization is closely linked with planning of the national economy. Such regionalization is expected to help distribute production correctly over the nation's territory, to organize a scientifically justified territorial division of labor and economic links between regions, and to make rational use of available natural and manpower resources and fixed capital.

Planning of the national economy on a nation-wide scale involves planning both by segments of the economy and by regions to insure the planned development of the economies of union republics and major economic regions.

The plan of economic development of the major economic regions is expected to insure the harmonic development of each major territorial link of the Soviet economy and of the system of economic regions as a whole with a view to achieving the highest possible rates of economic development with maximum savings of social labor.

When we speak of major economic (or economic-geographic) regions, we mean compact territorial groups of economic administrative regions that join in efforts to solve given economic objectives of national importance. The achievement of such objectives is insured in these groups of economic administrative regions by a unity of specialization and by the division of labor among them.

Major economic-geographic regions are not arbitrary groupings of republics and oblasts, but rather objectively existing economic units or prospective units expected to be formed during the plan period.

The Soviet economic-geographic literature sometimes contains ideas opposing to the objective existence of regions the delimitation of regions "for convenience of planning."

There is no need for such an opposition of ideas. In a Socialist planned economy "planning convenience" does not mean to make the life of officials easier and more comfortable. "Planning convenience" in this case means a scientific delimitation of regions in accordance with an objective regionalization basis and in accordance with reality, with actual economic links and with the requirements of the national economy. The closer regionalization comes to its objective basis, the more "convenient" are planning and the regional management of the economy in general.

Soviet general economic regionalization has its traditions going back to the GOELRO (State Electrification) plan and the work of the Gosplan and the commission of the All-Union Executive Committee in 1921-22.

The features of such regionalization varied at different stages of Socialist construction in accordance with the level of economic development, the territorial distribution of production and the economic objectives of the given stage. Therefore the number of regions, their size, the character of their boundaries and their forms of organization differed at various stages. Economic regionalization is not a rigid scheme but a flexible tool of Communist construction and of economic planning, changing its forms in accordance with changing conditions and the objectives of Communist construction and in accordance with shifts in the geography of the national economy.

Now that the Soviet Union has entered the period of full-fledged construction of communism and faces the task of creating the material and technical foundations for communism, we must make appropriate changes in the country's economic regionalization, affecting not only the make-up and boundaries of individual regions but the actual system and forms of organization of regionalization.

The greatest change in the system of economic regionalization of the country was the 1957 reorganization of the management of industry and construction on a regional basis, establishing regional economic councils with jurisdiction over economic administrative regions. There is no doubt about the tremendous economic and political importance of that reorganization. It should be noted, however, that there is still much room for improvement in the system of economic administrative regions and Soviet economic geographers have plenty to work on.

The present stage of Soviet economic development once again opens

certain questions regarding general economic regionalization.

In the first place, we should stress the growing importance of general economic regionalization at the present stage. The tremendous growth of the national economy, especially the vast new construction projects both in new and in old regions, require the formulation of a real hypothesis of development of major economic regions over a long-term period.

In addition we are beginning to feel increasingly the shortcomings of the present territorial distribution of production. Despite repeated instructions by the Communist party calling for improved planning of the distribution of production, long-term economic planning by major economic regions is still unsatisfactory. The lack of a long-term hypothesis of development of major economic regions has resulted in discrepancies in the development of various segments of production on the territory of regions, the under-utilization of regional resources and the appearance of excessively long hauls and other irrational freight movements.

Planning of the national economy by major economic regions is assuming special importance now, at a time when a general long-term plan of economic development is being drafted for the period to 1975. Determination of the basic trends of economic development and of the scale of development of economic segments in each major economic region can help prevent errors in the territorial planning of individual sectors of production, avoid serious losses in the national economy and increase the effectiveness of capital investments.

The questions of integrated development and specialization of regions are being posed anew at the present stage of Soviet economic development. Technical progress, in particular, has led to an increased concentration of production. For example, while thermal power stations with a capacity of 100,000 to 200,000 kw were once considered large, gigantic thermal power plants with a capacity of 2.4 million kw are now being built. While oil refineries once had annual crude throughput capacities of up to one million tons, refineries now being designed have a capacity of several million tons. Steel plants are being built no longer for a capacity of 300,000 to 400,000 tons a year, but 4 to even 6 million tons. Specialization and automation in machine building tend to promote the practice of subcontracting in the machine-building industry.

Similar changes are taking place in other sectors of production. They tend to strengthen the region-forming effect of major industrial nodes and to expand the framework of economic regions. The same effect is being achieved by improvement of transportation and reduction of freight rates, tending to bring regions closer together in economic terms.

At the same time there is a tendency for new industrial nodes to arise and for industrial and agricultural consumption to increase sharply within small territories, thus promoting greater regional differentiation and a reduction of

the territorial limits of some regions.

Major changes are also taking place in the structure of industry: there has been a sharp relative expansion of the machine-building and chemical industries, especially organic synthesis. These industries, whose region-forming role was once negligible, have nowin many cases become the sectors of specialization of several major economic-geographic regions. A whole system of subcontracting within the machine-building industry is being established within these regions. The country's fuel balance is shifting toward the use of more economical fuels, such as gas and oil.

These and other changes are affecting the specialization and integrated development of regions and altering the dimensions and directions of economic links within and between regions, thus requiring changes in the make-up and the boundaries of regions.

The need for changes in the make-up and boundaries of major economic regions arises from the shifts in the geographical distribution of production that took place during World War II and the post-war period.

Even greater changes in the geography of production are expected in the long-term future. New powerful territorial production complexes are to be formed, especially in the Asian part of the USSR. The precise outlines of the new geography of production expected by 1975 are still unclear, but there is no doubt of the great scope of such changes.

New approaches to questions of general economic regionalization are also needed as a result of changes in the system of economic management, the expansion of rights of the union and autonomous republics, and the increased role of local authorities in the management of the economy.

Under these new conditions there is an acute problem of coordination in economic planning and in the operations of territorial groups of economic administrative regions in general.

The basic economic regions delimited by the Gosplan USSR in the third five-year plan (1938-42) were never established as territorial-administrative units because economic planning and management were then handled mainly by central ministries and agencies. The adoption of the regional principle of economic management now requires real coordination of the operations of territorial groups of economic administrative regions and agreement of development plans.

The establishment of coordinating organs in the major economic regions is therefore a practical matter of great urgency. It would increase the importance of economic planning by major regions, and regional planning authorities would cease to be virtually "without an address." That in turn will promote the importance of general economic regionalization.

Such a combination of operational coordination and long-term planning would admittedly result in contradictions in the drafting of regional schemes. Any "enthusiasm of the future" in determining the make-up and boundaries of regions would be restrained by the requirements and conditions of the present in organizing a network of coordinating organs. Therefore a network of major economic regions based on the need for organizing coordinating organs would contain fewer elements of the long-term future than a network based only on the long-range prospects of economic development.

The Gosplan USSR and its Economic Research Institute have been working on general regionalization since 1956. Prior to that time questions relating to economic regionalization, especially the existing network of 13 basic economic regions used by the Gosplan USSR, were discussed in the press and at various conferences.

A commission designated by Gosplan USSR reviewed the network of basic economic regions in 1956 and early 1957, submitting a new scheme to Gosplan. Subsequently questions of general economic regionalization were repeatedly discussed in the Council for the Study and Distribution of Productive Forces and in other branches of Gosplan USSR together with people from the scientific research institutions of the Academy of Sciences USSR and others.

At all stages of the discussion of various proposed schemes of major economic-geographic regions there were many differences in points of view among the participants. Almost everyone had his own idea of a regional system. And that is not surprising. The point is that various participants focused their attention on different aspects of economic links between the regions and their specialization. The objective basis of economic regionalization is unusually complex. No completely isolated regions exist in reality. The network of economic links does not stop at regional boundaries but is continuous. Economic regionalization can identify only the most significant regional links, and a decision on what is the most significant in any given case is not so simple.

The commission proposal worked out in early 1957 was submitted to Gosplan USSR, but in view of the reorganization of Gosplan and the reorganization of the management of industry and construction it was not examined at the time. At the end of 1958 the Economic Research Institute of Gosplan USSR submitted a new proposal to Gosplan's Council for the Study and Distribution of Productive Forces. The new plan took account of the new conditions created by the reorganization of the management of industry and construction on a regional basis. That plan served as the point of departure for further discussions of systems of major economic regions. Compared with the 1956 plan of the Economic Research Institute, the new plan provided for fewer regions, taking account of the tendency toward regional consolidation connected with technical progress, the expansion of the rights of local authorities in economic management, and so forth.

Subsequently the Council for the Study and Distribution of Productive Forces made a number of changes in the Institute's plan. Both organizations in the autumn of 1959 submitted a joint proposal to the Gosplan USSR. Departments of the Gosplan commented on the proposal. Opinions were also solicited from various scientific institutions, including the Academy of Sciences USSR and Moscow University.

The suggestions of the Department of Economic Geography at the University, with their insistence on a finer regional network, were not adopted by the Council. The regional scheme was agreed upon with Gosplan RSFSR and with the Academy of Sciences USSR and in that form, with minor changes, was adopted by the Council for the Study and Distribution of Productive Forces and submitted to the leadership of Gosplan USSR.

The final draft of a system of major economic regions thus does not belong to any particular person or institution, having incorporated the opinions of many institutions and persons.

The solution of such an important national problem had to take account of the opinions and needs of many interested organizations and institutions. The Economic Research Institute, being close to the practical operations of Gosplan, could not divorce itself from the practical aspects of regionalization. The opinions of other institutions and organizations had to be taken into account. Incidentally, it might be recalled that an important part of the economic regionalization work of Gosplan and the All-Union Central Executive Committee's commission in 1921-22 consisted in agreeing upon a regionalization scheme with all interested institutions and organizations.

How did the Council for the Study and Distribution of Productive Forces and the Economic Research Institute of Gosplan USSR finally solve the regionalization problem? Gosplan USSR itself has yet to reach a decision on regionalization, so that the present paper is devoted only to the plan submitted by the Council for the Study and Distribution of Productive Forces of the Gosplan USSR.

First of all, regarding the questions of principle of general economic regionalization. All agreed that major economic regions should be delimited on the basis of regional specialization combined with an integrated development of the regional economy and that these two elements were not mutually exclusive, but on the contrary had close interconnections.

It was also generally accepted that a major economic region should have a great economic potential if it was to achieve economic objectives on a nation-wide scale. A region should have natural resources adequate to insure both a specialization for the national market and the development of an integrated regional economy. The productive forces of a major economic-geographic region should make possible the development of a large territorial economic complex with its own system of subcontracting in the machine-building industry, with its own chemical industry and so forth.

Under present Soviet conditions, this requires regions of large size of the order of hundreds of thousands of square kilometers and, in the sparsely settled parts of the Asian section of the USSR, even of the order of millions of square kilometers. However, an excessive enlargement of regions should be avoided in view of the excessively long inter-regional hauls that would result.

No definite quantitative criteria were established. Some discussants took a negative attitude to even the most approximate attempts to define the size of regions in terms of area, population and economic potential, without offering any positive suggestions. However the majority opinion was that the present system of 13 regions in general corresponded to the type of major economic regions.

The general growth of the Soviet economy during the two decades since Gosplan set up the 13-region system and the growth expected in the long-term future, the formation of new industrial complexes, the opening up of new natural resources, and the further differentiation of regions within the system of a national territorial division of labor -- all these factors require a certain increase in the number of major regions. The delimitation of additional regions would make it possible to reflect more accurately the regional specialization and the distinctive character of the economy of parts of the Soviet Union, and would thus insure a differentiated approach to the regions in national economic planning.

However such changes in the number, the make-up and the boundaries of the major economic-geographic regions do not alter the general type of such regions and do not require radical changes in the entire regional system. Economic planning experience has shown that the Gosplan's system of 13 regions reflected rather well the actual territorial division of labor and served as a satisfactory instrument of territorial planning on a national scale. The changes of the last two decades tending to form new regions are not of such a magnitude as to require the scrapping of the entire regional system.

It should also be borne in mind that in addition to the tendency to differentiate, dismember and form new economic regions, there exists objectively an opposite tendency to stabilize the existing network of regions. The planned economic development in the Soviet Union tends to promote the integrated character of regional economies, develops intra-regional ties, further strengthens regional specialization through the accumulation of labor skills, the creation of experienced manpower, the growth of fixed capital, and so forth.

There is an objective tendency not only to stabilize the existing regional system, but to consolidate and merge regions into larger units. That tendency is promoted by the region-forming role of large industrial centers, the expansion of the radius of zones served by large modern power stations, machine-building plants, oil refineries, chemical plants and other enterprises, the development of specialization and subcontracting systems within

larger territories, improvement of transportation and reduction of freight rates tending to expand the limits of rational hauls, the development of pipeline and electronic transportation, and so forth.

All these objective tendencies must be taken into account in a general economic regionalization of the country. Excessive emphasis of any one of them may yield wrong solutions.

For example, emphasis on the regional differentiation trend may produce an excessively fine regional network (such as the system proposed by the Department of Economic Geography at Moscow University consisting of 29 regions), which in turn limits the possibilities of developing systems of subcontracting among enterprises and the development of intra-regional ties, and unnecessarily complicates territorial economic planning on a nation-wide scale.

On the other hand, emphasis on the regional consolidation trend may produce excessively large regions (such as the proposals to make all of Siberia a region and to establish Volga-Urals and Kazakhstan-Central Asia regions). Such an approach tends to submerge the distinctive character of individual regions and to combine within a super-region areas with essentially different economic objectives; it thus cancels out the required differentiated approach to the planning of regional economies.

If all these objective tendencies are taken into account in the development of major economic regions, there is no need for a substantial change in the number of regions. In fact, the proposal now being considered by Gosplan USSR calls for only a slight increase-- from 13 to 16 regions (see map on Page 11).

In the course of the discussion of the make-up and the boundaries of the regions, many specific suggestions were offered, some of them mutually exclusive. In the end, after long argument, the changes made in the existing system turned out to be small compared with what had been originally assumed on the basis of the present distribution of production and the great changes expected in the next 15 to 20 years.

This is explained by the fact that the only changes made in the present regional structure were those fully required at the present time and which were essential for the territorial planning of the Soviet economy.

The changes that will be required at the end of the long-term planning period or those that are based on long-range assumptions yet to be approved and refined were not included in the regional scheme pending the actual need for such changes. This explains why the eastern regions, expected to grow rapidly in the long-term future, were subject to only minor changes.

Such a cautious approach was dictated not only by the fact that any unnecessary changes would require extra statistical work but by the

Present System of 13 Economic Regions

1- Northwest
2- North
3- Center
4- Volga
5- North Caucasus
6- Urals
7- West Siberia
8- East Siberia
9- Far East
10- West
11- South
12- Transcaucasia
13- Central Asia-Kazakhstan

Under the revision now under consideration by Gosplan USSR, Region 3 (Center) would be divided into three regions, and Region 13 (Central Asia and Kazakhstan) would be divided into two regions, making a total of 16 regions.

consideration that premature changes would cause extra difficulties in the organization of coordination within the major regions.

The fact that the major economic regions will contain certain organs for coordinating the work of existing economic administrative regions is sufficient reason not to be carried away by the long-term prospects of general regionalization and to work more closely to current reality.

Then there is the terminology problem. Since the 21st party congress in January 1959, the terms "major economic-geographic region" or "major economic region" have been widely used. Some economic geographers tried to read a new meaning into these terms compared with the previously used "basic economic region". Actually there is no difference in principle between major economic-geographic regions and basic economic regions, and attempts to find such differences are fruitless and confuse a simple and clear question.

In previous studies on regionalization and in some official documents the word "region" as applied to major economic regions has been used both in the singular and in the plural; for example, "the region of the Urals" and "the regions of the Urals". The material submitted to Gosplan USSR uses only the singular to avoid confusion and to make clear that a major economic region is not something devoid of wholeness.

We will now deal briefly with the changes proposed in the make-up and the boundaries of regions according to the plan submitted to Gosplan USSR.

The greatest changes are proposed in the Central Region of the European USSR. According to the present system the Central Region contains 24 economic administrative regions (out of 103 in the USSR as a whole), or almost one-fourth of the economic administrative regions of the USSR and more than one-third of those of the RSFSR. The present Central Region contains almost one-fifth of the population and more than one-fourth of the industry of the USSR. Obviously such a huge territorial unit, even if it has some basis for being regarded as a single major economic region, is not very suitable for economic planning on a nation-wide scale, let alone the RSFSR, for which such an excessively large region can cause many problems in economic planning and in the coordination of the large number of regional economic councils (each of which has jurisdiction over an economic administrative region).

But it is not just a question of size and the number of economic administrative regions. Various parts of the Central Region differ significantly in their conditions of economic development and their economic objectives. There are of course strong ties between the Central Chernozem oblasts and Moscow, and between Moscow and Gor'kiy with its tributary forested Trans-Volga area. But at the same time, these parts of the old Central Region have now acquired sure signs of being independent major economic-geographic regions, and that will be true all the more in the future.

The proposal to subdivide the Central Region was made many years ago both in the Gosplan and in the economic-geographic community. It was also incorporated into the 1956 plan of the Economic Research Institute and in the plans of other organizations. Most proposals called for the Central Region to be divided into the Moscow Region, the Central Chernozem Region and the Volga-Vyatka Region, with many differences in the regional boundaries.

The problem of regionalization of the Central Region could be handled two ways: either by dividing it into the above-mentioned three regions or by setting up two larger regions, the Central and the Volga, each being divided into subregions: the Central Region into the Moscow and Central Chernozem subregions, and the Volga Region into the Gor'kiy and Middle Volga subregions, with Stalingrad and Astrakhan' oblasts being assigned to a Southeast Region. This would have made the Volga Region a strong industrial region between the Center and the Urals.

The idea of setting up the new Volga Region and the Southeast Region, proposed by the Economic Research Institute of Gosplan USSR, failed to win the support of Gosplan RSFSR and the Volga Region thus remained virtually unchanged in the new regional plan.

A second major change in the former regional structure involved the separation of the joint Kazakhstan-Central Asia Region into separate Kazakhstan and Central Asia regions. These two regions fulfill different functions in the national territorial division of labor, they have different specializations and their own internal economic links. In terms of productive forces, population and area, each corresponds to a major economic region.

There was much dispute regarding the regionalization of the northern part of the European USSR. There was a proposal for merging the Northwest and Northern regions into a single region. The objective basis for such a proposal was the close link between the two regions in terms of fuel supply, the steel industry and the timber industry, the economic gravitation of the North toward Leningrad, the relatively low level of development of the North, and the impossibility of organizing a subcontracting system in the machine-building industry of the North. Furthermore the Economic Research Institute proposed that in the future the Komi ASSR be included in the Urals Region if the Urals-Pechora railroad is ever built. And without the Komi ASSR, a Northern Region would be unthinkable as a separate major economic region.

However, the Council for the Study and Distribution of Productive Forces decided to leave the Northern and Northwest regions unchanged since the prospects of the Urals-Pechora railroad link and of the Kama-Pechora-Vychegda river-diversion project are still unclear.

The regionalization of Siberia and the Far East remains essentially

unchanged in the plan submitted for approval by Gosplan USSR. Kurgan Oblast, previous in Western Siberia, is assigned to the Urals in view of its gravitation toward the Urals and the strengthening of economic ties with the Chelyabinsk and Sverdlovsk oblasts.

The question of the regionalization of Siberia provoked the hottest arguments. The point of view of the Department of Economic Geography at Moscow University, proposing seven Siberian regions, including some with a rather low level of industrial development, such as a West Siberian Region (including Tyumen', Omsk and Kurgan oblasts), a Yakut Region and a Northern Far East Region (Magadan and Kamchatka oblasts), did not find acceptance. (For a statement of the Moscow University case, see Soviet Geography, June 1960, pp. 50-60.) The main argument was between the proponents of a merger of Western and Eastern Siberia into a single region and the advocates of the present two regions. The case of the proponents of a "single Siberia" is presented by A. Vedishchev in Planovoye khozyaystvo, 1959, No. 12, pp. 67-72. The majority of the Council disagreed with that view and the idea of a "single Siberia" was rejected.

In the course of the discussion regarding Siberia and the Far East, several persons, including representatives of the Economic Research Institute, raised the question of separating a Northeast Region consisting of the Yakut and Magadan economic administrative regions. There were also suggestions for separating the entire northern part of the Asian USSR as a separate Far North zone, requiring the special attention of planning authorities in view of its distinctive economic conditions, its nationality problem and so forth.

The separation of the Northeast Region was adjudged premature, and planning for the Far North as a specific economic zone was considered desirable, though without setting it up as a separate economic-geographic region.

Some plans for a general economic regionalization contained proposals for the establishment of major economic regions within the Ukrainian SSR and the Kazakh SSR. The objective basis for such proposals was the existence of substantial economic differences within these large republics and the presence of specializations and close economic links within parts of these republics. In their economic potential some parts of the Ukrainian SSR were regarded as similar to major economic regions established elsewhere in the USSR.

Such a division of the Ukrainian SSR and the Kazakh SSR was also proposed in the regional scheme worked out in 1956-57 by the commission of the Gosplan USSR.

However after the organization of economic administrative regions in 1957 within both the Ukraine and Kazakhstan, and also in view of the

expansion of rights of union republics, the need for dividing these republics in addition into major economic-geographic regions was seriously questioned. It was felt that this would complicate rather than simplify economic planning and would create a cumbersome system of economic regionalization. There is no need for setting up such regions within the Ukraine and Kazakhstan for economic planning on a nation-wide scale. But there is of course no objection to the republics' establishing their own regions for purposes of republic-wide planning.

The review of the existing network of major economic-geographic regions is only the first step in the long-range planning of the national economy by major territorial subdivisions. The next step is the drafting of the basic directions of development of the regional economies or, as it is sometimes expressed, the drafting of hypotheses of regional development for the long-range future. That work has already begun. It would be hard to exaggerate its importance for improving the territorial distribution of production.

According to the regional scheme now under consideration by Gosplan USSR, all major economic regions are to be grouped into three broad economic zones: West, Middle and East. During the discussion of that point in the Council for the Study and Distribution of Productive Forces, four and even five such zones were proposed. However, the Council decided in favor of three zones.

The purpose of these zones is to define the basic territorial proportions and the main directions in the distribution of productive forces by broad territorial subdivisions of the USSR.

The old division of the USSR into West and East is no longer adequate. The regions of the East now differ in their conditions of economic development. The regions of the Urals, Western Siberia and Kazakhstan, whose basic natural resources have been opened up at a rapid rate since the first five-year plan (1928-32), have already acquired a highly developed industry, agriculture and transportation network. In the case of the Urals, in fact, many economic problems are similar to those of the West. The situation is entirely different in the case of Eastern Siberia and the Far East, where the opening up of rich natural resources is only beginning and where the basic problems of economic development involve the opening up of new regions, their settlement and the creation of new production complexes.

Each of the three proposed economic zones is distinguished by common economic problems to be solved in the long-range future and by a certain economic completeness.

The formation of such powerful territorial complexes of a higher order, including nearly all sectors of production, will greatly contribute to the stability of the economy of the basic sections of the Soviet Union. The country is now sufficiently developed to insure the full-fledged integrated

development of several broad economic zones.

The work done on general economic regionalization by Gosplan USSR in cooperation with institutes of the Academy of Sciences USSR has not solved all problems in that field. Economic geographers still face several unsolved problems of economic regionalization that require further consideration.

I will list some of these problems without attempting completeness or strict selectivity.

The current period of large-scale construction of communism in the Soviet Union once again poses the question of the economic function of the political boundaries between republics. Economic geographers should deeply analyze the economic function of political boundaries between republics and study that question from the point of view of the long-range construction of a Communist society.

In general there is need for further development of all methodological questions of general economic regionalization as applied to the period of large-scale construction of communism.

The general economic regionalization is based on the economic administrative regionalization. We should look into the question of improving the present system of economic administrative regions and the administrative-territorial division of the country with a view to improving the general economic regionalization. We also need additional work on the network of major economic regions to take account of shifts in the distribution of production expected in the long-range future.

We should also organize research on intra-regional and inter-regional economic ties of the major economic regions, both in the present and in the future.

Other important questions also require the attention of Soviet economic geographers.

INTRA-OBLAST REGIONALIZATION

By I. V. Komar, M. I. Pomus and S. N. Ryazantsev

Regionalization of oblasts, krays, autonomous republics and union republics that have no oblast breakdown (in other words, regionalization of what are in most cases the territories of economic administrative regions) has become one of the most widespread forms of general or integrated economic (economic-geographic) regionalization. That type of regions, hereafter arbitrarily designated as "intra-oblast regions", has been delimited in a wide range of economic-geographic studies of the geography

faculties of universities, the branches and sections of the Geographical Society USSR, in dissertations dealing with the integrated geographic study of given areas, and in many other books and articles. (For a bibliography on intra-oblast regionalization, see O. A. Konstantinov's paper on "The present status of economic-geographic studies on the economic regionalization of the USSR, Soviet Geography, September 1960, pp. 36-59.) Intra-oblast regions serve as an important element in the teaching of economic geography and in some cases are used in the economic planning of regional economic councils (for example, in the Yakut ASSR and Chita Oblast). Intra-oblast regions are also used in industrial design and prospecting work. They are also used in working out general plans and major problems of development and distribution of productive forces for large territories, as in the case of the conference on the development of the productive forces of Eastern Siberia in 1958.

A detailed economic regionalization of areas is not a new problem. In one form or another it has long attracted the attention of leading geographers and economists in our country. Before the Revolution there were quite a few valuable studies on detailed regionalization, especially during Russia's capitalist period of development, when economic-territorial differentiation and the process of formation of economic regions began to develop in earnest. At certain stages of development during the Soviet period, economic areas similar to intra-oblast regions were designated as okrugs in the Soviet administrative-territorial structure.

All this shows that the problem of detailed intra-oblast regionalization above the rayon level is a vital problem related to the objective processes of the territorial division of social labor. In a planned Socialist economy, the delimitation of such regions promotes better planning and a more rational distribution of productive forces. It also makes possible the optimal solution of regional integration problems and an analysis of the combination of natural and economic factors in various parts of economic administrative regions.

Despite the widespread use of that type of regionalization in scientific research, and in part in government practice, we still lack an adequate formulation of basic principles underlying the concept and the nature of an intra-oblast region, its main features and its place in the system of integrated economic regionalization.

The view has been expressed in the literature that intra-oblast regions are not one of the basic types of economic regions. The argument is that such regions do not correspond to any element in the administrative structure of the country and that such a link is supposedly an essential attribute of any basic type of economic region in the USSR. Actually, if under the Soviet system every administrative unit must in fact also be an economic area, it does not mean that every category of economic regions must correspond to an administrative unit. The point is that objectively existing economic regions of various ranks are expected in a Socialist economy to

function also as "economic-planning regions" and to promote better territorial economic planning, which does not always require separate government administration organs at that level.

It is also said sometimes that intra-oblast regions in general do not exist and their delimitation is artificial. Such erroneous views are due to a certain degree to the above-mentioned lack of a formulation of principles and methods for delimiting intra-oblast regions. Such regions are now usually delimited on the basis of the sum of a wide range of features without distinguishing primary and secondary features. The selection of region-forming features has been handled differently by various authors. In most of the present studies, oblasts are divided into regions on the basis of economic features. The preference for physical factors, characteristic of some studies of the past, is no longer found. But in most of the current studies, intra-oblast regionalization is based only on differences in specialization. It is true that this aspect plays a key role in the formation of intra-oblast regions. But researchers giving priority to that aspect should not lose sight of another feature, the degree of integration of the economy, even if it is less clearly evident at the lower levels. Furthermore specialization is often understood not as an association of mutually interrelated economic sectors, but in the more narrow sense, thus leading to regionalization based entirely on the criterion of homogeneity. This results in a frequent confusion of integrated, general economic regionalization with specialized, predominantly agricultural, regionalization.

The exclusion by some authors of intra-oblast regions from the general system of economic regionalization is sometimes countered by an opposite error: it is to consider the various types of regionalization as completely identical and to apply them at all levels without a statement of criteria and without regard for the specific characteristics of each taxonomic unit of the regional system.

Before discussing the concept of intra-oblast region and its characteristics, we must recall certain basic aspects of the entire system of economic regionalization and clarify the function of intra-oblast regions.

The main criteria for delimiting economic (economic-geographic) regions in the USSR are: (1) a production specialization and (2) an integrated development expressed in various combinations on the territories of different taxonomic orders. At the same time each level in the system is an integral part of territorial-production complexes of a higher order. Intra-oblast regions are basically one of the types of such objectively existing or prospectively planned territorial production complexes. The aggregate of all complexes, from the largest to the smallest, constitutes the system of economic regionalization of the USSR.

The main criteria underlying the entire regionalization system take on distinctive features at the level of intra-oblast regions. In addition, there are supplementary criteria used in economic regionalization that assume

a different importance in the case of intra-oblast regions. We will now briefly discuss these features.

Each intra-oblast region is a functionally distinctive part of an oblast, kray or autonomous republic (a territorial "production shop", so to speak), reflecting a given aspect of their territorial production complexes. Such intra-oblast regions are of course distinguished by a more limited selection of specialized sectors and by a lower level of economic integration than the economic administrative regions of which they are a part. Intra-oblast regions are therefore usually areas with a more sharply expressed economic specialization, retaining, however, substantial elements of economic integration. The specific combinations of specialization and integration depend on whether the intra-oblast regions contain basic economic nodes or production "nuclei" of the economic administrative regions or whether they lie outside of such nuclei. An analysis of the detailed regionalization used in the economic-geography monographs of the Geography of the USSR series, published entirely or in part by the Institute of Geography of the Academy of Sciences USSR, and of the regionalization adopted in the three-volume Ekonomicheskaya Geografiya SSSR, edited by G. N. Cherdantsev, N. P. Nikitin and B. A. Tutykhin, shows that the great majority of intra-oblast regions have the above-mentioned basic characteristics of territorial production complexes of the given order.

Intra-oblast regions differ widely, of course, in size, population, economic potential, the breadth and nature of their specialization and in degree of economic integration. Many that contain basic production "nuclei" of the higher taxonomic units in the system of economic regionalization constitute important elements of the national economy or of major economic regions. We should also note the great differences in size between economically more developed and under-developed regions. The second type is generally much larger, as can be seen readily from a comparison of the regions of the East and West of the USSR.

As in the case of other units, the specialization of an intra-oblast region expresses the specific direction of development of the economy as it evolved historically through the division of labor based on the area's physical, economic and ethnic characteristics. Research into the combination of factors affecting that specialization is especially important at the intra-oblast level because specialization at that level, as was noted above, is usually more sharply expressed and plays a bigger role in defining the character and boundaries of regions than in the case of economic regions of a higher order. Such research should cover natural conditions and resources, the geographic location, the transportation net, the history of settlement, manpower resources, economic habits of the population, availability of production capacities and housing, and so forth.

It is also important to identify factors that may result in a change of direction of economic development, produce new lines of regional specialization and alter the region's function in the territorial production complexes of a higher order.

The presence of economic centers and their formation and development also are of increased importance in the case of intra-oblast regions. In a large number of such regions, making up at least half of the regions discussed in the Geography of the USSR series, such economic centers are large industrial centers and transportation nodes having ample commercial distribution and scientific and cultural facilities.

In addition to the administrative centers of oblasts, krays and republics, other large cities, such as Rybinsk, Arzamas and Kamyshin, can serve as the region-forming centers of intra-oblast regions.

In some intra-oblast regions, the region-forming economic centers consist of two or three economically interconnected cities. Elsewhere such regional centers consist of a group or agglomeration of settlements that have developed on a common basis of physical and historical- economic factors -- coal-mining settlements, clusters of ore-mining settlements, groups of agricultural processing centers, timber-processing settlements, and so forth.

Such importance of cities and urban settlements in general as region-forming centers is explained by the leading role of industry in the national economy, the increasing distribution of industry over the territory of the USSR and the expansion of ties between industrial centers and nodes and surrounding areas. Since that process will continue, the number of intra-oblast regions formed around industrial centers is expected to increase.

There is also a rather large group of intra-oblast regions that have no specific region-forming center. Such regions usually arise because of common economic specialization (assuming a certain degree of integrated development) throughout their territory. They include for example, specialized timber regions, such as Vishera in the Western Urals, and Narym in Siberia, and specialized agricultural regions, such as the Omsk steppe, the Saratov trans-Volga region, the Bezhetsk-Kashin region or the Kura-Aras region. Even within such regions small industrial centers are formed. Such regions usually gravitate toward a large marketing center situated outside the region but within the same oblast, kray or republic. Characteristic of many such regions is a main transportation artery which together with its branches unites the region and promotes the development of the entire economic complex.

Intra-oblast regions are also formed to a certain extent because they are generally somewhat isolated from the relatively more important industrial nodes of the oblast. In some cases, especially in sparsely settled areas, such isolation becomes a dominant factor in the formation of such regions. Such isolated and sparsely settled areas can actually not be regarded as economic regions in the full meaning of the word and the usual regional criteria can be applied to them only arbitrarily, as in the case of Bauntovskiy Rayon of the Buryat ASSR. In some cases such areas are better merged with adjoining, economically more distinct regions linked

with the isolated areas by transportation or other ties; for example, Katanga Rayon of Irkutsk Oblast could be combined with the Upper Lena region of that oblast.

In considering the natural factors that may affect the formation of regions, we must bear in mind not just the fact, generally accepted by Soviet geographers, that the natural environment is not a determining factor. It is also important to note that economic regions are formed to a large degree because of the natural heterogeneity of their parts, both from the physical-geographic and from the geological point of view. However in the case of intra-oblast regions there is less heterogeneity, especially in very specialized regions such as farming, timber or mining regions.

Of substantial importance in intra-oblast regionalization is the presence of national minority territories, such as autonomous oblasts and national okrugs, within the economic administrative regions. They are undoubtedly economic territories as well as administrative-political units. Therefore national autonomous areas also function as intra-oblast regions in the system of economic regionalization. These areas are often quite distinctive. For example, they include huge, sparsely settled territories, such as the Khanty-Mansi National Okrug, with more than 500,000 square kilometers.

Some national autonomous areas are very close economically and from the viewpoint of prospective development to adjoining parts of oblasts and krays and should therefore be considered a part of such territorial production complexes. That applies, for example, to the extreme south of Krasnoyarsk Kray, which includes Khakas Autonomous Oblast and the Minusinsk right-bank area.

Population also is a factor in intra-oblast regionalization, especially in the delimitation of regions in areas with a diversified ethnic composition.

Compact concentrations of a given non-Russian nationality form the ethnic basis of autonomous oblasts and national okrugs, which, as we have already noted, represent a certain economic unity and enter as such into the system of intra-oblast regions. The ethnic structure of the population can also affect the delimitation of other intra-oblast regions; for example, if the given territory has scattered settlements of small ethnic groups (as in Gornaya Shoriya) or more or less substantial groups of an ethnically homogeneous population residing in the territory of another national autonomous area (as in southern Kazakhstan and elsewhere).

The population factor also appears in intra-oblast regionalization in other respects. They include: a high population concentration or, on the contrary, a wide scattering of population in various parts of economic administrative regions; territorial distinctiveness and combinations of urban and rural population; working skills that may affect the specialization of certain regions, and so forth.

Intra-oblast regions, like the other taxonomic units of economic regionalization, are subject to change with time. As productive forces develop and the geographic division of labor changes, there can often be substantial shifts in the boundaries and make-up of regions.

In general such mobility is greater in the network of intra-oblast regions than in the network of higher-order regions. The construction of a transportation route, of an industrial node or of a large irrigation system can often lead to the forming of new intra-oblast regions; as examples we can cite the Bratsk-Tayshet, Western Yakut, Pechora and Pakhta-Aral regions. Even more rapid can be the change in specialization of such regions as a result of a major industrial, transportation or agricultural project, as in the Chu valley, the Tatar trans-Kama area, Karaganda and the central Krasnoyarsk region. However, the outlines of intra-oblast regions nevertheless remain sufficiently stable over a rather long period of time.

With further promotion of the regional principle of economic planning and further increases in the creative initiative of the masses and in the role of local authorities under central guidance, the economic and scientific importance of a detailed regionalization of the USSR is steadily growing. Under these conditions it becomes increasingly important to work out a single network of intra-oblast regions of the USSR based on a uniform methodology. The experience thus far accumulated and the increasingly unified formulation of scientific principles make it possible to consider this question as one of the next major projects in geography.

At the present time work on intra-oblast regionalization is being done without coordination by various organizations and individual authors. The first over-all attempt to define intra-oblast regions in the USSR is reflected in the Geography of the USSR series of economic-geography monographs published by the Institute of Geography of the Academy of Sciences USSR in conjunction with other academic and nonacademic institutions. Despite some differences in approach to regionalization and the degree of detail, these studies represent a first draft of a system of intra-oblast regions. Also valuable is the intra-oblast regionalization scheme contained in the above-mentioned three-volume economic geography of the USSR.

One of the key prerequisites for such an over-all regionalization project is the formulation of a uniform methodology for delimiting regions on the basis of the principles of intra-oblast economic-geographic regionalization. Unfortunately such a methodology is still far from being sufficiently complete.

The scientific delimitation of detailed regions on the basis of a uniform methodology would help improve the territorial organization of the Soviet economy, promote research into the specialization and integrated economic development of oblasts, krays, autonomous and union republics and their parts, and help us better understand the physical and economic geography of the Soviet Union. A solution of that problem would raise economic-geographic research to even higher levels.

ECONOMIC REGIONALIZATION OF THE UKRAINIAN SSR

By I. A. Kugukalo, L. M. Koretskiy I. A. Velichko

1. Objectives and Aims of the Paper. This paper is designed to examine the question of economic regionalization of the Ukrainian SSR at its present stage of economic development and within the general regionalization of the USSR. The aim of the paper is to define a network of major economic-geographic regions of the Ukrainian SSR, each with a national specialization as it is expected to be formed under the long-range plan of Communist construction in the USSR.

The proposed division of the Ukrainian SSR into three basic economic regions, each including a contiguous group of economic administrative regions, may serve Gosplan Ukrainian SSR and Gosplan USSR as a basis for planning the integrated development of these basic regions over the long-term future.

2. Formulation of the Problem. The entire history of economic construction and of the development of statehood in the USSR during the Soviet period has been closely linked with questions of economic and administrative regionalization, carried out under the leadership of the Communist party and based on V. I. Lenin's ideas about the rational distribution of productive forces. At each new stage of economic development of the country, economic regionalization has been faced with new requirements.

The question of general regionalization has become especially important at the present time. It relates both to the tasks stated by the 21st party congress in January 1959 for the nation's economic development during 1959-65 and the tasks of long-term planning for the next 15 to 20 years, of which the seven-year plan is a component part. At the 21st party congress N. S. Khrushchev stressed the importance at the present stage of planning the national economy in terms of major economic-geographic regions. "The goals envisaged by the seven-year plan," he said, "would insure the further specialization and integrated economic development of republics and of major economic-geographic regions such as the Urals, Siberia, Central Asia and Transcaucasia. In this connection we must strongly combat any tendency to view an integrated economy as a closed-off economy. The delimitation of major economic-geographic regions in planning would promote the correct geographic distribution and the most economical territorial organization of the national economy of the Soviet Union" (Kontrol'nyye tsifry razvitiya narodnogo khozyaystva SSSR na 1959-65 gg. Tezisy doklada N. S. Khrushcheva na XXI s" yezde KPSS (Control Figures of Development of the National Economy of the USSR in 1959-65. Theses of the speech by N. S. Khrushchev at the 21st Soviet Communist Party Congress), Gospolitizdat, Moscow, 1959, p.72).

Under Soviet rule the Ukrainian SSR has become an industrially and

agriculturally highly developed republic of the Soviet Union with a powerful heavy, light and food industry and a large-scale mechanized agriculture, a republic of advanced science and culture. Major changes have taken place in the territorial organization of production, meaning the distribution of productive forces. Together with a great increase in production, the specialization and integrated development of the old Donets-Dnieper industrial region has been intensified. The former mining-and-industrial character of the region has been supplemented by production of electric power in the Donets Basin and the Dnieper area and by a machine-building industry in those two sub-regions and in the Khar'kov node. The productive forces of oblasts situated on the Black Sea have also grown and received a new direction. They now include electric power, machine building, a modern food and light industry, and a Socialist agriculture. Major changes have also taken place in the economic development of other parts of the republic, the central oblasts grouped around Kiev and the western regions of the Ukraine. The western regions, like the other parts of the unified Ukrainian Soviet state, have now passed through Socialist transformations in all fields of economic and cultural life. The former differences in economy and culture between the western regions and other parts of the Ukraine have now disappeared.

In view of the great economic changes that have taken place in the Ukraine, the tremendous growth of its productive forces, some of which now play a key role in the national division of labor, and especially in view of the prospects of economic development during the seven-year plan 1959-65, conditions are now ripe for the delimitation of major economic-geographic regions in the Ukraine.

The delimitation of such regions, which may serve as a basis for planning by Gosplan Ukrainian SSR and may be regarded as part of the over-all system of basic economic regions of the USSR, is required by the needs of further integrated regional development, of improving the geographic distribution of productive forces and the territorial organization of the economy, and the possibility of speeding Socialist reproduction by planning economic development in terms of major regions.

3. Methodological Bases. In drawing up the scheme of economic regionalization of the Ukraine, the authors were guided by the existing methodology of general regionalization. Two main aspects were borne in mind: (a) the definition of the concept of economic region and its relationship to the boundaries of union republics; (b) the relationships between economic regionalization and the economic administrative regionalization carried out in the Ukraine in 1957 as part of the reorganization of industrial management.

The main methodological principles are contained in the proceedings of the commission of Gosplan USSR that worked on the delimitation of basic economic regions in 1956. The memorandum "Principles of Economic Regionalization of the USSR", which was adopted by the commission, states: "The methodology of present-day economic regionalization retains the definition of economic

region given by Gosplan and the commission of the All-Union Central Executive Committee in 1921-22, according to which an economic region is a territorial production unit with internal production links, having a specialization for the national market whose planned development would insure an increase in the productivity of social labor" (The main points of that memorandum are listed in P. M. Alampiyev's book Ekonomicheskoye rayonirovaniye SSSR (Economic Regionalization of the USSR), Moscow, 1959. The preceding quotation is from p. 191).

However the new economic conditions of the present stage of Communist construction require a more precise formulation of various aspects and of the dynamics of regional development. That has been done in the following definition: "An economic region is a territorial production complex that is constantly developing and acquiring new sectors of production and insures the fullest and most rational utilization of natural and manpower resources in the interests of the national economy as a whole and the economic region in particular. As the utilization of the region's natural and economic resources grows, its level of economic development rises, its production structure is enriched, its national specialization is strengthened, the local regional availability of raw materials, fuels, electric power, supplies, and producer and consumer goods is further insured, and internal links between parts of the region and links with other regions become more complex and diversified" (P. M. Alampiyev, Ekonomicheskoye rayonirovaniye SSSR, p. 190).

In accordance with the existing methodology, which predominates in the literature and has been approved by the commission of the Gosplan USSR, economic regionalization must leave inviolate the boundaries of union republics, as sovereign state units. The largest union republics are divided into basic economic regions.

Another major question of present-day economic regionalization is its relationship to the existing economic administrative regionalization introduced in 1957. The authors of this paper feel that there is a direct and close link between the two regionalization systems and that such a link is a basic characteristic of regionalization at the present stage of Communist construction.

Having been carried out under the leadership of the Communist party and having been developed on the basis of the Leninist principles of democratic centralism, the 1957 regional reorganization of industrial management and the formation of economic administrative regions constitute a legitimate stage in the development of Soviet economic regionalization.

The economic administrative regions were formed both in the Ukraine and in the USSR as a whole on the basis of the existing administrative-territorial divisions, taking account of the level of industrial development, production links, specialization and other features, and have therefore an economic and administrative unity. They are potentially whole parts of basic economic regions and can be considered as sub-regions of economic regions.

The Eastern (Left-Bank) Region consists of five economic administrative regions -- Dnepropetrovsk, Zaporozh'ye, Lugansk, Stalino and Khar'kov, the latter consisting of three oblasts -- Poltava, Sumy and Khar'kov. (Under the revision of May 1960 (see Soviet Geography, September 1960, p. 83), Poltava Oblast was set up as a separate economic administrative region. It would presumably be regarded as part of the Central (Kiev) Region of the present scheme. -- Editor, S.G.) The Eastern Region extends from the northern boundaries of the republic to the Sea of Azov and covers almost the entire Left Bank of the Dnieper. It has an area of 196,000 sq. km. and a population of 16.6 million, of which 10.9 million are classified as urban. This is a major industrial region of the USSR and its primary coal and steel base, with a highly developed machine-building, metal-fabricating, chemical and building-materials industry. The region's main fuel base, the Donets coal basin, has been supplemented in recent years by natural gas from the Shebelinka field.

Close production links and common development problems combine the economic administrative regions of the Left Bank into a major economic-geographic region of the Ukraine and of the USSR accounting for a substantial share of the national output of major industrial products. It accounts for more than half the gross industrial production of the Ukraine, including all the iron and steel, more than 9/10 of the coal and iron ore, all the manganese, almost two-thirds of the machine building and metal fabrication, a large part of the chemical industry and more than half the construction materials and glass and three-fourths of the cement.

In addition to coal, iron ore and manganese, pig iron and steel, in which the region holds a leading place in national production, it also supplies a wide range of machinery and equipment, especially for heavy industry, including tractors, main-line diesel engines, freight cars, turbines, generators, electric motors and transformers. The region also plays an important role in the production of fertilizers, sulphuric acid and other chemicals.

The main characteristic of the region is the predominance of heavy industry, manufacturing the means of production for the national economy. Heavy industry accounts for more than four-fifths of the total industrial production of the region.

The basis of the entire industrial complex is the coal, iron-ore, manganese, and iron and steel industries. The industrial structure consists of a distinctive combination of mining (coal, iron ore, manganese, fluxing materials, chemical raw materials) and manufacturing (iron and steel, nonferrous metals, machine building and metal fabrication, coke chemicals and other chemicals, refractories and building materials).

A major constituent of the regional economy is the food and light industry which obtains its raw materials from the agriculture of this and other regions and which relies for its machinery and its market on the region's basic heavy

industrial complex with its labor force of 2 million persons.

The largest labor force is employed in machine building and metal fabrication, followed by fuels, iron and steel, light industry, food industry, and building materials. In terms of gross value of production, iron and steel is the leading sector.

The Eastern Region has favorable conditions and huge resources for the development of agricultural production. A large area of fertile lands -- about 13 million hectares of cropland, a strong mechanization base and adequate manpower insure the development of a diversified agriculture. The main sectors of specialization are: grain, industrial crops (sunflowers and sugar beets) and livestock products. In 1958 the region accounted for 41 per cent of the Ukraine's grain production, including more than half the corn, 65 per cent of the sunflower seed, 25 per cent of the sugar beets, and more than half the melon crops. The region is a major producer of commercial winter wheat. It also plays a major role in animal products, accounting for almost a third of the Ukraine's total number of cattle, hogs and sheep.

The planned integrated development of the regional economy is promoted chiefly through the strengthening of internal production links. Typical of the region is the predominance of inter-industry bulk shipments of coal, iron ore, manganese, steel, fluxing materials and building materials. The high degree of development of machine building and other industries favors further development of specialization and subcontracting within the region.

The basic regional units are the Donets Basin, the Dnieper area and the Khar'kov and Zhdanov industrial nodes.

The main regional goals for the seven-year plan and the long-range future are:

Continued growth of the iron-ore and manganese industries of the Krivoy Rog and Marganets-Nikopol' basins, as well as the opening up of new deposits of iron ore (Kremenchug and Belozerka) and manganese; reconstruction and modernization of the Donets Basin mines; construction of new mines, especially in the eastern wing of the Donets Basin, and the introduction of improved methods for mining coal and transporting it to bulk consumers (hydraulic mining and hydraulic-conveyor transportation); further development of the steel and coke-chemical industries in the old areas and establishment of new nodes of those industries; forced draft development of the chemical industry based on natural gas and on the utilization of by-products and waste of the coke industry, oil refining and mineral raw materials;

further development of the steel and coke-chemical industries in the old areas and establishment of new nodes of those industries;

forced-draft development of the chemical industry based on natural gas, and on the utilization of by-products and waste of the coke industry, oil refining and mineral raw materials;

strengthening and creation of a new local raw-material base of nonferrous metallurgy, including aluminum and mercury, rare and disseminated elements, such as zirconium and others, and development of the Samotkan titanium deposit;

commercial exploration and development of oil and gas resources in the Donets-Dnieper depression and development of an oil and gas industry;

further expansion of the electric power base through the construction of economical thermal stations;

further development of the light and food industries designed to bring production closer to consumption areas and to make greater use of women workers in those industries in areas where coal mining and steel making are concentrated;

technical improvement of the machine-building industry and of specialization and subcontracting within that major regional sector;

further improvement of the water supply for the Donets Basin and the Krivoy Rog area and development of a local milk and vegetable supply base and fruit orchards for the population of industrial centers.

The Central (Kiev) Region includes four economic administrative regions: Kiev (consisting of Kiev, Zhitomir, Kirovograd, Cherkassy and Chernigov oblasts), Vinnitsa (Vinnitsa and Khmel'nitskiy oblasts), L'vov (Volyn', L'vov, Rovno and Ternopol' oblasts) and Stanislav (Transcarpathian, Stanislav and Chernovtsy oblasts). (Under the May 1960 reorganization, a fifth economic administrative region, Cherkassy, was separated, consisting of Cherkassy and Kirovograd oblasts. -- Editor, S. G.)The Central Region has an area of 293,000 sq. km. and a population of 20.3 million people, of whom 5.8 million, or 28.5 per cent, are urban. The region includes the northern and central parts of the Ukraine from the Dnieper to the western border and constitutes a large, diversified territorial production complex. The region accounts for more than 30 per cent of the gross industrial output and 40 to 45 per cent of the agricultural output of the Ukraine.

The region has an integrated economy with a clearly defined specialization for the Ukraine and the Soviet market. In industry, the specialization consists of diversified machine building, mainly precision items requiring relatively little metal, the food and light industries and the chemical mineral and processing industries. Of inter-regional importance are the gas, timber, woodworking, paper and porcelain industries. The region's share in the Ukrainian production is: more than one-fifth of the machinery output, including all or nearly all production of buses, motorcycles, television receivers,

tractor-mounted planters and light bulbs; 87 per cent of the truck-mounted cranes, 45 per cent of the forge-press equipment, 32 per cent of the machine tools, a large part of the instruments, machines and other equipment for the chemical, food-processing and light industries; almost 45 per cent of the processed foods, including more than 65 per cent of the sugar and cheese, 41 per cent of the meat, 35 per cent or more of the butter, canned goods and bakery products and 80 per cent of the alcohol; more than 45 per cent of the output of light industry, including all the silk goods, two-thirds of the leather goods and 50 per cent of the leather footwear, and 45 per cent or more of the knitted goods and hosiery; one-third of the output of the chemical mining and processing industry and two-thirds of the output of the timber, woodworking and paper industries, including 95 per cent of the building timber, 93 per cent of the plywood, 75 to 85 per cent of the paper and paperboard, and 60 per cent of the furniture.

The three largest industrial sectors are food-processing (44 per cent of the total industrial output), light industry (19 per cent) and machine building and metal fabrication (12 per cent). They are followed by the fuels and electric power industries (taken together), the building-materials industry and the chemical industry. The region has its own fuel base in bituminous coal (L'vov-Volyn' basin) and lignite (Kirovograd, Cherkassy, Zhitomir and Transcarpathian oblasts), natural gas, oil and peat. The water power of the Dnieper, Dniester, Southern Bug and the Carpathian streams is also of some significance.

Agriculture, characterized by a diversified development, high intensity and commercial market orientation, is part of the regional economic complex with close production links with industry. The main agricultural specializations for the Ukrainian and Soviet market are industrial crops (sugar beets, fiber flax, and to a certain degree sunflowers), livestock products, potatoes and orchard products.

The region includes more than 40 per cent of the cropland of the Ukraine, 70 per cent of the sugar-beet crop, the entire flax crop, four-fifths of the potatoes, more than half the cattle, almost 60 per cent of the cows, 52 per cent of the hogs and 38 per cent of the sheep. Agriculture supplies raw materials to the food-processing and light industries. Dozens of new factories are to be built in the current seven-year plan to process farm products, including two large linen mills. In grain farming the region accounts for 75 per cent of the Ukrainian rye crop and 62 per cent of the buckwheat crop.

The main regional nuclei with a predominant machine-building and instrument-manufacturing industry are the Kiev and L'vov nodes. Other machine-building centers are Kirovograd, Berdichev, Belaya Tserkov', Korosten', Vinnitsa and Fastov. The presence of a large number of machine-building and metal-fabricating plants creates favorable conditions for further specialization and subcontracting.

The main regional objectives in the current seven-year plan and the long-term future are:

maintenance of high rates of industrial development, based mainly on local raw material sources, and expansion of low-bulk, labor-oriented machine building with transfer of part of the farm population to industrial production;

expansion of the electric power supply, especially through further growth of gas and oil production in the Carpathian foreland and the development of the deposits in Chernigov Oblast, and multi-purpose utilization of the water-power resources of the Dnieper, the Dniester and the Carpathian streams;

development of a Carpathian node of the chemical mineral and processing industry based on the integrated utilization of natural and oil-field gas, oil, sulphur, and potash;

industrial development of new mineral resources (ilmenite, nickel ores, bentonite clay), improved utilization of available raw materials and fuels (bituminous coal and lignite and basalt);

reclamation and development of the potential agricultural resources of the Pripet Marshes, further intensification of farm production, and renewal and rational utilization of forest resources.

The Black Sea Region includes the Odessa and Kherson (Crimea, Nikolayev and Kherson oblasts) economic administrative regions. (In the May 1960 reorganization, Crimea Oblast was separated as a third economic administrative region. -- Editor, S. G.). This region is situated in the southern steppe section of the Ukraine and adjoins the Black Sea and the Sea of Azov. It has an area of 110,000 sq. km. and a population of 5 million people, of whom almost half are urban. In terms of production this region is far less important than the Eastern and Central Regions. It accounts for only 12 per cent of the total industrial output of the Ukraine.

Because of its favorable seaboard location, soils and climatic conditions, mineral resources and economic ties with other regions, especially the Eastern Region of the Ukraine, the Black Sea Region constitutes a distinctive territorial economic complex characteristic of only that part of the Ukraine. Its specializations are a highly developed machine-building industry, mainly shipbuilding, several segments of the food-processing and light industries, a highly commercial agriculture, specializing in winter wheat, sunflowers, vegetables, melon crops, grapes and fruit, and livestock products.

The leading industries are machine building, which employs more than one-third of the regional industrial labor force and accounts for one-fourth of the industrial output, and food processing, which accounts for 45 per cent of the industrial output. The region is one of the main Soviet shipbuilding zones. Other regional sectors of national importance are machine tools, transportation and hoisting equipment, road-building and farm machinery, instruments and electrical goods. The largest food-processing

branches are canned goods (about half the Ukrainian production), fish (80 per cent of the republic's catch) and wines. The region also makes one third of the Ukrainian cotton yarn and almost half the cotton cloth.

The second major component of the economic complex is agriculture. It accounts for 25 per cent of the Ukrainian winter wheat, 25 per cent of the sunflower seed and a third of the melon crops. The Black Sea Region is also a major fruit and winegrowing area, accounting for more than 80 per cent of the Ukrainian vineyards. A high proportion of sheep is characteristic of animal husbandry.

The main regional nuclei are the Odessa, Nikolayev, Kherson and Simferopol' industrial nodes.

The economic administrative regions of the Black Sea coast combine to form a major economic-geographic region because of common features in their historical development and in the present-day economy, internal economic links and common aspects of future development.

The region faces the following objectives in the current seven-year plan and the long-range future:

broad, integrated utilization of the Kerch' iron ore deposits for ore shipments to the Eastern Region of the Ukraine and for the establishment of an integrated steel plant at Kerch';

development of the salt resources of the Sivash lagoon and of the lakes of the northern Crimea, as well as vegetation resources, for development of the chemical industry;

further development and technical improvement of machine building, especially shipbuilding, and improvement of specialization and subcontracting in machine building;

reconstruction and further development of harbors to accommodate the growing Soviet foreign trade through the Black Sea ports;

development of the building-materials industry on the basis sawn limestone, and the creation of a large cement industry using Crimean marls and other raw materials of Nikolayev Oblast;

integrated development of the food-processing industry, stressing vegetables, fruits, wine, fish and animal products;

development of irrigation and water-spreading systems to expand the irrigated area and insure a water supply for agriculture;

expansion of vineyards and orchards throughout the Black Sea zone, and promotion of seaside resorts.

The economic regionalization of the Ukraine as part of the general economic regionalization of the USSR is an important measure for improving the distribution of production and the territorial organization of the Ukrainian economy. It will also make it possible to determine correctly the rates of growth in the various parts of the Ukraine, to solve major regional economic problems and to improve conditions for the further development of specialization and subcontracting of production and the rationalization of economic links. All this will help speed the rates of Socialist reproduction.

(Following is a paper from the Symposium On Natural (Physical-Geographic) Regionalization for Agricultural Purposes. Other papers of that symposium will appear in subsequent issues.)

A SOILS AND BIOCLIMATIC REGIONALIZATION OF THE USSR

P. A. Letunov, Ye. N. Ivanova, N. N. Rozov,
V. M. Fridland, D. I. Shashko, S. A. Shuvalov

The resolutions of the 20th party congress called for rational distribution and specialization of agricultural production taking account of local soils, climatic and economic conditions to insure maximum output of agricultural produce per 100 hectares of agricultural land with a minimum expenditure of labor and funds. The same objective was stated in the resolutions of the 21st party congress.

This assignment has made it necessary to systematize our knowledge of the natural conditions of the agricultural territory of the USSR, to appraise it from the viewpoint of the potentialities of agricultural production in the various regions, and to analyze the comparative economic efficiency of such production under rational systems of farm management and systems of farming.

The scientific institutions of the Academy of Agricultural Sciences and local agricultural organs in all republics, oblasts and krays have done a great deal of work in the last few years in drafting zonal systems of farm management and technical and organizational measures for increasing farm production per 100 hectares of agricultural land. This work takes into account differences in soil conditions and, in general, the natural conditions of the individual zones and regions. In the oblasts, krays and republics a regionalization of natural conditions based on soil regionalization has been carried out for these purposes.

In the Academy of Sciences USSR, work on the regionalization of natural conditions, particularly soil-geographic regionalization, was resumed at the beginning of 1954 at the request of Gosplan USSR, which asked the Presidium of the Academy of Sciences to work out a scientific division of the USSR into natural and economic zones and to obtain indices for a rational specialization of agricultural production for each of them. Later a simil ar

request was made by the Ministries of Agriculture USSR and RSFSR.

At the beginning of 1954 a team of soil scientists, geographers and botanists of the Soil Institute, the Institute of Geography, the Botanical Institute and the Council for the Study and Distribution of Productive Forces, under the direction of Academician I. P. Gerasimov and Academician I. V. Tyurin, worked out a scheme dividing the USSR into natural zones and provinces. That scheme was presented by N. N. Rozov and P. A. Letunov to the national soil-science meetings in 1954 and at the beginning of 1956. It is based on data of the natural-history regionalization of the USSR worked out in the Academy of Sciences in 1939-43 and subsequent data from the study of the soil-geographic conditions of the individual regions of the USSR (N. N. Rozov, 1954; P. A. Letunov, 1956).

Since 1956, at the invitation of the Academy of Sciences, the work on regionalization has been joined by universities under the direction of the Methodical Bureau organized by Moscow University with the participation of representatives of the Academy of Sciences. The universities are working on a detailed regionalization of the individual regions, embracing almost the entire territory of the Union. The Academy of Sciences is continuing work on the general regionalization of the whole USSR, taking into account the possibility of providing a single system of regionalization with the neighboring people's democracies.

Further work on the natural regionalization of the Soviet Union together with the adjacent territories of the people's democracies has brought out the necessity of supplementing the system of taxonomic units formerly used by us with larger subdivisions that would permit the grouping of zones. The 1947 proceedings of the Commission on the Regionalization of the USSR used the term "country" (strana) for units of a higher order than natural zones, distinguishing them by their geomorphic structure (for example, the country of the Baltic Crystalline Shield, the mountain country of the Urals, the Kazakh Folded Country). But that grouping combined territories that differed greatly in their natural conditions. For example, the Urals, extending more than 3,000 km. from north to south, include such varied landscapes as tundra, tayga, broadleaf forests and steppes; and the Kazakh Folded Country includes steppes and semi-deserts. Furthermore, a number of investigators (V. L. Komarov, 1922, L. I. Prasolov, 1922, I. P. Gerasimov, 1933) have shown that the natural zones in the various parts of our country are quite unique. This uniqueness has become especially distinct with the broadening and deepening of research in Siberia and the Far East on the one hand and in the west of the country on the other. We now have a clearer picture of the natural conditions of a large part of the USSR, including areas where the ground is frozen for long periods of time, the monsoon areas of the Far East, and so forth. These distinctive features form specific series of natural plains zones. For example, the natural zones of the Russian Plan with dark-conifer tayga on podsolic soils differ substantially from the plains zones of Eastern Siberia with light-conifer tayga on weakly podsolized soils or from zones of the Far East with herbaceous forests on various turf soils.

An analysis of the structure of vertical zonality showed that on territories having a certain latitudinal zonality vertical zonality also had a number of common features. This led to the necessity of giving up the combining of natural zones by geomorphic countries and constructing a system of major units of regionalization on soil-bioclimatic features. Such an approach is more correct for the further reason that the regionalization for agricultural purposes should take account in the first place of physical features that act directly upon the development of plants and the life of farm animals. They are primarily the climatic conditions and the character of the vegetation and soil formation induced by them. Climate and soils determine the possibility of the economically profitable cultivation of a given range of crops and the development of a given kind of animal husbandry.

The new scheme of soil-geographic regionalization of the USSR worked out out by the authors of the present paper proceeds from the doctrine of world soil-climatic belts and oblasts (facies) as the basic forms of manifestation of the law of world soil zonality formulated by V. V. Dokuchayev.

This doctrine has been stated in the works of Academician L. I. Prasolov and Academician I. P. Gerasimov. Certain elements of it are also found in the work of D. G. Vilenskiy.

Being built on a broad geographic foundation, the doctrine of world soil-bioclimatic belts and oblasts makes it possible to analyze simultaneously and conjointly both the physical-chemical and the bioclimatic characteristics of soil formation, which is of great importance for the agricultural appraisal of the soil cover. This doctrine also makes it possible to regard the soil cover of individual territories from the standpoint of whole continents or a world-wide scheme and makes it possible to relate closely the soil-geographic regionalization of individual countries which is important for the proper exchange of agricultural experience and crops.

Geological-tectonic factors and the geomorphic structure play a decisive role in mountainous countries, and in distinguishing okrugs and rayons in plains soil zones. The characteristics of the soil cover determined by them have strong influence upon the selection of rational systems of cultivation and reclamation measures for obtaining higher crop yields and in many cases also influence the distribution of crops.

Soil mapping is the foundation of soil-geographic regionalization, and such work may be therefore regarded as one of the kinds of use of soil maps. Soil mapping identifies by the cartographic method the areas of distribution of the units of soil classification (types, subtypes, genera and species of soils). The task of soil-geography regionalization includes the identification of the areas of distribution of homogeneous structures of the soil cover, i.e., combinations of soils of different orders.

The taxonomic system of soil-geography regionalization is based on an analysis of the structure, nature and genesis of soil combinations, taking

into account at the same time the geographic factors that determine them.

The soil zone is taken as the basic taxonomic unit under plains conditions and the vertical soil structure or mountain soil province is the basic unit under mountain conditions.

Starting from these basic units, the taxonomic system of soil-geography regionalization may be constructed both upward and downward. The ascending branch is constructed by uniting soil zones and vertical soil structures (mountain soil provinces) into soil-bioclimatic oblasts and soil-bioclimatic belts.

We can regard the latitudinal (horizontal) soil zone and the vertical soil structure as a macro-combination of soils, within which combinations of lower orders may be identified, furnishing the foundation for constructing a descending branch of the taxonomic system of soil-geography regionalization.

The taxonomic system as a whole looks as follows:

Soil-bioclimatic belt

Soil-bioclimatic oblast

Soil zone (and subzone)	Vertical soil structure (or mountain province)
Soil province	Vertical soil belt
Soil okrug	Mountain soil okrug
Soil rayon	Mountain soil rayon

A soil-bioclimatic belt is the aggregate of soil zones and vertical soil structures (mountain soil provinces), united by similar radiation and thermal conditions and their similar effect upon soil formation, weathering and the development of vegetation.

A soil-climatic oblast is the aggregate of soil zones and vertical soil structures united within a belt not only by similar radiation and thermal conditions, but also by similar moisture and continentality conditions and their similar effect on soil formation, weathering and the development of vegetation.

In climatology and geography it has long been customary to distinguish the following four climatic and natural belts: (1) cold (polar), (2) temperate (boreal), (3) warm (subtropical) and (4) hot (tropical). This simple scheme needs further detailing from both the soil and the agronomic viewpoint, taking into account the actual distribution of soil zones and crops; we must make a supplementary division of the temperate and warm belts into cold-temperate and temperate subbelts, and temperate-warm and warm subbelts (Table 1). In our scheme the subbelts of the temperate and warm belts are regarded as belts. The boundaries of these belts are characterized by unlike sums of temperatures.

In Western Eurasia they are higher, in Eastern Eurasia lower, which is apparently to be explained by the special thermal conditions of the summer in the monsoon climate area.

Table 1. Climatic data on soil-bioclimatic belts

Soil-bioclimatic belts	Sums of temperatures over 10° C at southern boundaries of belts	
	Western Eurasia	Eastern Eurasia
Cold (polar)	400	400
Temperate-cold (boreal)	2,600	1,400-1,700
Temperate (subboreal)	4,000	3,200
Temperate-warm subtropical	6,000	5,000
Warm subtropical	8,000	7,000
Hot (tropical)	------	------

Four belts are distinguished within the USSR.

The polar (cold) belt, including the arctic zone and the subarctic zone of tundra soils. The southern boundary corresponds approximately to the isoline of the sums of active (over 10°) temperatures amounting to 400°. The heat deficiency limits cultivation chiefly to sheltered ground.

The cold-temperate (or boreal) belt includes a number of subzones. The subzone of the northern tayga, is bounded in the north by the isoline of the sum of active temperatures amounting to 400°; in the south, to 1,200° (1,000° east of the Yenisey). This subzone corresponds approximately to the subarctic belt of the climatologists. Cultivation of vegetable crops with a short growing season is possible. In the southern part, at warm locations, cultivation of early varieties of grain crops is possible.

The subzone of the middle tayga with podsol, permafrost-tayga and pale-yellow soils; its southern boundary has a sum of active temperatures amounting to 1,600° in the western half and 1,400° in Eastern Siberia. This is the subzone of cultivation of early varieties of grain crops.

The southern-tayga subzone of turf-podsol and turf-podsol permafrost soils. It lies in the interval of active temperature sums ranging from 1,600 to 2,200°, and 1,400 to 2,000° in the east. In the extreme west, in the Pripet Marshes, the temperature sums reach 2,600°. This is the main crop-raising section of the non-chernozem zone with rich prospects for the development of a stable agriculture, with cultivation of feed grains and, in part, food grains (medium-early and early varieties), potatoes, flax, perennial grasses, vegetables, fruits and intensive animal husbandry.

The deciduous-forest zone of gray forest soils, gray forest permafrost soils, and the zones of turf, and non-podsolized and turf-podsol soils of

the Maritime oblasts. The southern boundary of the cold-temperate belt is the isoline of balanced precipitation and evaporation. The sums of active temperatures over a large part of the southern boundary are 2,200°; in the west they rise to 2,600 and 2,700°; in the east, in Siberia, they drop to 2,000°.

The temperate or subboreal belt includes the broadleaf-forest zones of brown forest soils of the western and eastern maritime (oceanic) oblasts, the forest-steppe zone of podsolized, leached and typical chernozems and the dry-steppe zone of dark-chestnut and chestnut soils, the semi-desert zone of light-chestnut and brown soils and the zone of northern gray-brown desert soils. The northern boundary of the belt has an active temperature sum of 2,400 to 2,600° in the west and 1,400 to 1,700° in Siberia; the southern boundary is the isoline of the 4,000° active temperature sum.

The temperate belt is the main region of cultivation of medium-early and late varieties of grain and groats crops, and a wide range of industrial crops: sugar beets, hemp, sunflowers, etc. In the dry steppes and semi-deserts is the zone of livestock grazing, chiefly sheep.

The subtropical temperate-warm belt includes the zone of humid forests with yellow earths and red earths, the zones of brown and gray-brown forest soils of Transcaucasia, the desert zone of southern gray-brown soils of the Turanian Lowland, and the piedmont semi-desert zone of gray soils.

The inclusion in the subtropical belt of the desert zone of southern gray-brown soils and the piedmont semi-desert zone of gray soils is somewhat arbitrary and subject to further discussion. A number of investigators disagree with such a division on the ground that the subtropical belt includes only plains territories with a rather warm winter that does not interrupt the growth of a number of less warmth-loving plants peculiar to the more northerly latitudes of the temperate belt. The reason for the inclusion of the zones of the gray-brown soils and the piedmont semi-desert zone of gray soils is that the hot summer permits annual crops of the subtropical belt, especially cotton, to be cultivated here.

Chinese scientists assign to the subtropical belt the zones in which crops of the temperate belt can be grown in winter so far as the thermal conditions are concerned and in which winter frosts causing damage to perennial subtropical plants occur only rarely. (The mean of the absolute annual minimum temperatures is lower than -10°.) Personal acquaintance with the subtropical belt of China causes us to recognize considerable truth in the Chinese viewpoint. If we accepted this, only the humid forests of the Black Sea coast of the Caucasus and the Lenkoran' subtropical zone could be assigned to the Soviet subtropics; the southern gray-brown soils and the gray-soil zone would be assigned to the temperate-warm subbelt of the temperate belt, since in these zones winter frosts interrupt the growth even of the grains of the temperate latitudes and require perennial warmth-loving crops to be covered up for the winter. We therefore consider it advisable to have

additional discussion on the question of the northern boundary of the Soviet subtropical belt.

The warm and hot (tropical) belts lie south of the borders of the USSR, especially in China, Burma, Vietnam and India.

Soil-bioclimatic oblasts are distinguished within each soil-bioclimatic belt in view of great fluctuations in moisture and continentality conditions caused by the circulation of the atmosphere. In terms of continentality, they may be broken down into three groups: oceanic, transitional and continental; in terms of moisture, into four groups: humid, subhumid, subarid and arid.

The attached map of soil-geographic regionalization (not available at time of publication in Soviet Geography) shows the following soil-bioclimatic oblasts:

In the cold (polar) belt, one Eurasian polar oblast (a) with tundra soils. It is possible that additional research will make possible further subdivisions.

The cold-temperate (boreal) belt contains four oblasts, two oceanic and two continental; (b) The western meadow-forest oblast of turf soils, including the northern part of Western Europe and, in the USSR, only the Kaliningrad province; (c) The central tayga-forest oblast, extending within the belt across the European Plain and Western Siberia to the Yenisey. It is characterized by a less mild, drier climate with continentality increasing from west to east, and by the distribution of gley-podsol, podsol, turf-podsol and gray forest soils; (d) The Eastern Siberian permafrost-tayga oblast occupies Eastern Siberia, the area of permanent and long-lasting seasonal frost. It is characterized by gley permafrost-tayga soils, permafrost-podsol and pale-yellow soils, and turf-podsol and gray forest permafrost soils; (e) The Far Eastern meadow-forest oblast, formed under the influence of the Pacific Ocean, is characterized by meadow-forest turf, acid non-podsolized and turf-podsol soils.

The temperate (subboreal) belt contains five oblasts, two humid oceanic, one transitional and two arid continental: (f) The western brown-forest-soil oblast extends over the plains and mountain provinces of Western Europe; in the USSR it occupies the mountain soil provinces of the Carpathians, the Crimea and the Northern and Eastern Caucasus. It is characterized by brown forest soils; (g) The central forest-steppe and steppe oblast extends over the steppes of the European and Asiatic parts of the USSR, and reaches into China and Mongolia. It is characterized by diminishing oceanic influences, the increase in warmth in the southern zones and the growth in continentality toward the east. It includes the forest-steppe zone of podsolized, leached and typical chernozems and gray forest soils; the steppe zone of ordinary and southern chernozems, and the dry-steppe zone of dark-chestnut and chestnut soils; (h) The influence of Pacific monsoons defines the relatively large eastern brown-forest-soil oblast with brown forest and dark-colored turf-meadow soils; (i) The central

part of the Eurasian continent contains the desert-steppe and desert oblast, with the highest aridity and considerable continentality. It includes the desert-steppe zone of light-chestnut and brown soils, the desert zone of gray-brown soils and the foothill semi-desert zone of low-carbonate gray soils; (j) The high-mountain desert oblast of the Pamir and the Tien Shan, reaching farther east into the mountain country of China.

The pattern of diminishing oceanic influences is repeated within the temperate warm (subtropical) belt: (k) The temperate-warm moist-forest oblast in the west covers relatively small sections in western and eastern Transcaucasia. It is characterized by red and yellow soils; (l) The temperate-warm xerophytic-forest and shrub-steppe oblast extends into the USSR on the south from Asia Minor in relatively small sections. It has brown and gray-brown forest soils; (m) The temperate-warm semi-desert and desert oblast occupies the plains of Eastern Transcaucasia, the southern part of Soviet Central Asia and reaches eastward into Mongolia and northern China. It has gray-brown desert soils of the southern type and gray soils. Farther east, in the Chinese People's Republic, another oblast of the moist subtropics is formed under the influence of the Pacific monsoons.

The delimitation of belts and oblasts is of great theoretical and practical significance. It may be noted that from the viewpoint of a world classification of soils the soil-bioclimatic belt combines the soils of one world group and the soil-bioclimatic oblast combines the soils of one class.

The taxonomic units of the lower ranks are defined as follows:

Soil zone: area of distribution of a zonal soil type and the associated intrazonal soils.

Soil zones may extend both east-west and north-south (Northeast China, North America, Eastern Australia). We may distinguish east-west and north-south sections of soil zones.

Mountain soil province (or vertical soil structure): area of distribution of interrelated vertical soil belts, determined by the position of the mountain country (or a part of it) in the system of soil-bioclimatic oblasts and by the main characteristics of its common orography.

In terms of orographic characteristics, according to Chinese soil scientists (who have worked more on this question), we can distinguish mountain, plateau, basin-and-mountain and plains-and-mountain soil provinces, each with specific characteristics in their vertical soil zonality. Mountain forms predominate among these soil provinces.

Since the vertical zonality in mountains is determined mainly by the position of the mountain country in the system of climatic belts and oblasts, the mountain soil province is similar to the soil zone of the plains in its

taxonomic position in the regionalization system. If soil-bioclimatic oblasts contain a large number of mountain soil provinces they can be grouped by bioclimatic principles.

The soil province is a part of the soil zone distinguished by specific soil characteristics and by the conditions of soil formation, due either to differences in moisture and continentality (in the east-west sections of soil zones) or to temperature differences (in the north-south sections of soil zones). Identification of provincial differences within soil zones is of great agronomic significance. For example, the provinces of the chernozem zone, having the same type of chernozem as the basis of soil combinations, are characterized by a gradual decrease in the thickness of the humus horizons from west to east, an increase in the humus and nitrogen content and changes in their total supply. The length of the growing season changes considerably, diminishing toward the east; the sum of active temperatures diminishes in the same direction, as does the seasonal course of the heat and moisture supply to plants. All this creates differences in the soil climate (see Tables 2 and 3).

In the Eastern Siberian chernozem provinces seasonal ground frost becomes significant, changing the water and heat regime of the soil and consequently the intensity and course of the processes taking place in it; it causes considerable gleyizing of the chernozems.

While winter crops and intertilled crops, as well as medium-early and late ripening corn varieties, can be cultivated in the western provinces, unfavorable wintering conditions for winter crops in the east result in a predominance of spring crops, corn cultivation being confined to the earlier ripening and consequently less productive varieties. At the same time, the lengthy seasonal ground frost insures better soil moisture during the spring-crop growing season and increases yield stability.

The vertical soil belt is a part of the vertical soil structure, characterized by the predominance of a certain zonal mountain soil type combined with other zonal and intrazonal soil types. The character of the combination depends on the orographic characteristics of the mountain country.

On the slopes of monolithic mountain uplifts one zonal soil type predominates. In deeply dissected mountain country, the characteristic soil type of the particular belt may be associated with a lower-lying zonal soil type rising up through the valleys and a higher-lying zonal soil type descending from isolated summits. Zonal soil types may also vary on slopes with different exposures.

The soil-bioclimatic provinces are identified on the attached map (not available). Altogether, 72 provinces are distinguished in the plains and 36 soil provinces in mountain country.

The soil okrug is part of a soil province or vertical soil belt, characterized

by a certain genetic relief type (or a combination of genetic relief types), producing a certain combination of parent rocks and soils. Okrugs are also distinguished by local climatic and vegetation features.

In the interest of republic and intra-oblast planning, soil okrugs should not be too small. The following okrugs may serve as examples: the Meshchera lowland of sandy-loam and sandy turf-podsol soils combined with turf-gley and peat-bog soils; areas with a terminal-moraine landscape; moraine plains with turf-podsol soils. As may be seen from the example of the Middle Russian provinces, an okrug is a rather large section of a soil province and is in turn divided into more homogeneous units -- soil rayons.

By soil rayon we mean part of a soil okrug characterized by relatively homogeneous relief and soil-cover composition, and by homogeneous plant cover and microclimatic characteristics.

The proposed system of taxonomic units is an extension and refinement of the system proposed by us in 1956.

In units below the soil zone, the same system was proposed by the Methodical Commission on Soil Regionalization at Moscow State University in accordance with our report in the spring of 1956, with subsequent revision in the spring of 1957.

Okrugs and rayons are now being identified by local authorities during regionalization of individual republics, oblasts and krays. Our study group is compiling a map of soil okrugs in the Soviet Union.

In any soil-geographic regionalization great significance is attached to the agroclimatic and bioclimatic characteristics of the territory to be regionalized. This is important because the distributuion of soil varieties and plant forms is connected with bioclimatic indices. A comparison between maps of natural and agroclimatic regionalization reveals close agreement between soil-zone boundaries and the isolines of the sums of active temperatures in the north, and between soil-zone boundaries and moisture zones in steppe and desert areas. The moisture index used here is the ratio of the annual precipitation to the sum of the average daily values of the air humidity deficit. The observed intertwining and occasionally a certain divergence between the zonal boundaries is explained by relief conditions determining the local redistribution of soil moisture, the physical and chemical properties of the subsoils affecting the soil-forming processes, and so forth.

The above-presented data for a system of soil-geographic regionalization make it possible to draw some general conclusions. The identification of soil-bioclimatic belts and oblasts as the largest units of regionalization has proved fruitful, permitting easy comparison of the natural characteristics of parts of the Eurasian continent. Discussion of the plan for a soils and integrated natural regionalization of China with Chinese specialists

Table 2. Climatic Conditions and Some Soil Properties in the Provinces of the Forest-Steppe Zone

Indices	Provinces					
	Ukrainian	Middle Russian	Trans-Volga	Western Siberian	Altay Foreland	Central Siberian
Climate						
Sum of active temperatures greater than 10°C.	2,600-2,800	2,400-2,700	1,900-2,300	1,850-1,950	1,700-2,000	1,400-1,600
t° of warmest month	20.0 -20.5	19.0 -20.0	19.0 -19.5	18.5 -19.0	19.0-20.0	17.0 -18.0
t° of coldest month	-5 ,-8	-8,-13	-13,-16	-16,-20	-20,-21	-18,-20
Duration of period with $t^{\circ}>+5^{\circ}$	205-211	184-195	159-175	152-157	146-157	138-145
Duration of period with snow cover	85-90	126-132	143-147	156-158	157-166	134-145
Depth of snow cover in cm.	15-32	26-60	40-60	28-47	27-59	28-68
Annual precipitation in mm.	453-645	457-592	385-589	300-389	406-409	317-411
Ratio of warm-season precipitation to cold -season precipitation	1.6-2.1	1.2-2.7	1.5-1.0	--	1.6-1.2	1.3-2.5
Moisture index for year	0.77-1.0	0.77-1.0	0.55-1.0	0.77-1.0	0.77-1.0	0.77-1.0

Soils						
			podsolized chernozems			
% of humus in top layer	4-5	5-6	8-9	9-10	9-10	8-9
Thickness of humus horizons in cm.	70	50-60	50	45-50	50	40
Average humus supply in the humus horizon in kg. per sq. m.	30	32	35	37	40	30
Depth of upper limit of carbonates in cm.	150-160	130-140	120	100	120	100
			leached chernozems			
% of humus in A horizon	7	8	10-12	10-12	10-11	9-10
Thickness of humus horizons	100-120	80	60	50	50-55	40-45
Humus supply in kg. per sq. m.	38	44	46	42	45	32
Depth of upper limit of carbonates	130-140	110	100	70-80	80-90	70
			typical chernozems			
% of humus in A horizon	5-6	10	10-14	--	10-12	--
Thickness of humus horizons in cm.	120-140	100	70	--	60	--
Average humus supply in humus horizon in kg. per sq. m.	54	78	67	--	60	--
Depth of upper limit of carbonates	60	70	60	--	50	--

Table 3. Climatic Conditions and Some Soil Properties in the Provinces of the Steppe Zone of Ordinary and Southern Chernozems

Indices	Provinces							
	Azov-Caucasus Foreland	Ukrainian	Middle Russian	Trans-Volga	Kazakhstan	Altay Foreland	Minusinsk	Chita
Climate								
Sum of active temperatures greater than 10 °C.	3,300-3,500	2,800-3,300	2,650-3,000	2,300-2,800	1,950 2,300	2,000-2,200	1,500-1,900	1,500-1,700
t °of warmest month	22.5-24.0	20.5-22.5	20.0-21.0	19.5-20.0	19.0-20.0	20.0	---	18-18.5
t °of coldest month	-1, -5°	-1, -7°	-7, -18°	-13,-16°	-16,-18°	-18, -19°	-19,-20°	-25,-27°
Duration of period with t°>5° C.	221-227	180-229	197-203	170-188	158-172	158-167	143-161	131-152
Duration of period with snow cover	76-95	76-88	86-111	135-139	148-150	149-153	151-153	135
Depth of snow cover in cm.	5-28	6-16	21-46	30-52	16-26	28-56	24-34	8
Annual precipitation in mm.	407-474	327-476	401-481	286-403	252-379	272-397	308-348	276
Ratio of warm-season precipitation to cold-season precipitation	2.1-1.0	1.4-1.7	1.2-1.5	1.3	2.7	1.7-1.3	4.1-2.6	14.0
Moisture index for the year	0.44-0.55	0.44-0.77	0.44-0.77	0.44-0.77	0.44-0.55	0.44-0.77	0.33-0.55	0.22-0.38

Soils	high-micellar carbonate		ordinary chernozems				"deeply washed"	
% of humus in A horizon	3-8	5-7	7-8	8-9	8-9	8-9	7-8	4-7
Thickness of humus horizons in cm.	120-140	100	70	60	50	50-55	50	40-50
Average humus supply in humus horizon in kg. per sq. m.	48-42	40	45	45	35	37	30	17-30
Depth of upper limit of carbonates in cm.	10-20	20-30	50	50	40-30	30	30	80-100
Depth of beginning of sulfate and chloride deposition in meters	none	4.0	3.2	3.1	2.0	2.8	2.0	none
	surface-micellar carbonate		southern chernozems				"washed"	
% of humus in A horizon	3-4	4	4-6	5-6	5-6	5-6	4-6	3.5-4.0
Thickness of humus horizon in cm.	80-90	70	60	50-55	45-50	50	40	35-40
Average humus supply in humus horizon in kg. per sq. m.	20	22	21	26	21	24	18	12-15
Depth of upper limit of carbonates	0	30	40	50	35	30	20-25	70-80
Depth of beginning of sulfates and chlorides in meters	3.5-4.0	3.0	2.8	2.0	1.5	2.0	1.5	4

(Huang Ping-wei and others) showed that this system was also applicable to China and made possible a more precise comparison between the natural conditions of the USSR and China.

Some sections of the temperate-cold belt (the Great Khingan) extend into the northern part of China. Of considerable extent in China is the temperate belt with the monsoon oblasts of broadleaf forests and meadow steppes similar to the Soviet Far Eastern oblasts. China also has arid oblasts similar to the steppe oblasts of Eastern Siberia . A clearly defined temperate-warm belt extends in East China from Peking to the Hwai Ho and the Chin Ling mountain range and westward across the desert steppes and deserts of Inner Mongolia, Kashgaria and Sinkiang. This belt is divided into oceanic oblasts with monsoon climate and continental oblasts with semi-desert and desert conditions. Kashgaria and Sinkiang correspond to the southern deserts of Soviet Central Asia and the southern part of Kazakhstan. China also has an extensive subtropical belt and the northern part of a tropical belt with soil-bioclimatic oblasts reflecting Pacific Ocean influence and the presence of the mountain country of Tibet. The latter makes up the high-mountain oblasts of the temperate-warm and subtropical belts, of which the Pamir and the central Tien-Shan are the Soviet outposts.

The distinction of belts and oblasts in Western Europe also permits us to understand more exactly the similarity and difference in the natural conditions of the western part of the USSR and the adjacent countries of Western Europe.

The significance of such a zonal division for agricultural production has been noted above. The identification of soil-bioclimatic oblasts assists in the analysis of the genesis of soils and their classification. In this respect it is important to note the identification of an Eastern Siberian oblast of tayga-permafrost soils. The influence of extracontinental conditions also affects the soil formation in adjacent steppe oblasts to the south. As we learn more about the soils of the adjacent zones of Eastern Siberia, the Mongolian People's Republic and Northern China, we will probably be able to distinguish further a Central Asiatic steppe oblast with its own types of soil formation. In any case, it is clear even now that the non-carbonate, often acid chernozems of Eastern Siberia differ substantially from the chernozems of the European part and of Western Siberia and are a specifically Eastern Siberian type of chernozems, characterized by their own genetic features and agronomic properties.

The identification of desert oblasts of the temperate belt (Central Kazakhstan) and of the temperate-warm belt (the Turanian lowland and Soviet Central Asia)leads us to seek differences in the properties and genesis of the gray-brown desert soils developed in these oblasts.

The identification of soil-bioclimatic oblasts is also important for determining correct systems of farming and measures for raising soil fertility.

The European-Asiatic polar oblast is not a farming oblast. Vegetables can be raised only in covered ground, partly under artificial illumination. In the warmest locations near the southern border of this oblast early vegetable crops and perennial grasses for hay can be grown. This is an oblast of fishing, hunting and fur farming.

The western meadow-forest oblast of brown soils and turf-podsol soils has a mild, moist climate due to the influence of the Atlantic Ocean. It offers broad possibilities for cultivating crops of the temperate belt. The long growing season permits intercropping; the increased precipitation favors fallowing for green manure. But in plains areas the runoff of atmospheric precipitation and ground water is impeded, the soils are excessively moist and swamp-forming processes develop. The systematic draining of soils is therefore a necessary part of measures for increasing their fertility. Kaliningrad Oblast, which is part of this natural oblast, has long applied drainage and a greater percentage of land than elsewhere in the USSR is drained by covered drains. Liming of the soils and abundant use of organic and mineral fertilizers are also required. This territory is well developed agriculturally.

The extensive central-tayga-forest oblast of gley, podsol, turf-podsol and gray forest soils, with all the diversity of its vast territory, is united by certain common features of agricultural production. It is customary in the agronomic literature to call this part of the Soviet Union the non-chernozem zone. It is an oblast of agriculture and forestry. Conditions for farming improve from north to south as one moves away from the polar oblast and approaches the steppe oblasts, and also from east to west as agroclimatic conditions are improved by the effect of the Atlantic Ocean.

The northernmost subzone of gley-podsol soils has the least favorable conditions for farming. Here heat resources are limited. Only early vegetables, early varieties of potatoes and, in the southern part, early spring barley, oats and perennial grasses are assured of enough heat. Farming in this subzone has been developed only in a few parts along rivers with lighter and warmer soils.

The soils here are poorest and excessively moist for the greater part of the growing season. Farm development, aside from clearing forests and bushes, requires systematic draining of plowland, even outside the swampy tracts; systematic liming, and abundant organic and mineral fertilizers. Various heating methods are also effective (ridges, shields, coulisses).

The subzone of the northern tayga is mainly an oblast of forestry and hunting, fishing, reindeer raising and of dairy farming in the river valleys. Farming has a nodal type of distribution. In the future, too, it will be limited to the vicinity of industrial projects. Most difficult of all are the conditions for farming in the Siberian provinces of this subzone; here the growing season is shorter, winter frosts are more severe, swamps are more widespread, and the soils freeze deeper and harder. The tilled area in this subzone is less than 1 per cent.

The middle-tayga subzone of podsol soils has more favorable conditions for farming. Among the crops that ripen here are the coarse cereals, winter wheat, early varieties of legumes, vegetables, potatoes, perennial grasses; in warm locations, corn for silage and green fodder. In Siberia the range of crops is more limited. The small reserves of humus, the strong acidity, the thinness of the plant-root horizons require deepening and cultivating of the tilled layer by gradually plowing up the lower horizons and employing soil deepeners. Liming, growing of perennial grasses, introduction of organic and mineral fertilizers are obligatory farming procedures in this subzone; more favorable are the conditions in the small areas with turf-carbonate soils. The whole subzone is characterized by excessive moisture. The loamy soils of the level watersheds and gentle slopes, and also of the flat lowlands, are waterlogged, especially in spring and in the second half of the summer. Of great significance here, therefore, are methods of draining plowland and improving the surface runoff (strip plowing, grading of field surfaces, furrowing of plantings, cropping on ridges). Only thoroughly permeable sandy-clay and sandy soils are not affected by waterlogging and require no such measures.

In this subzone, a large area is occupied by lowland and upland swamps, which, upon being drained, cleared and prepared for cultivation, can be converted into good hayfields and fertile plowland.

The subzone of podsol soils has been only slightly opened up for farming; the tilled area fluctuates between 1 to 10 per cent. The gaining of new lands in this subzone requires clearing and lengthy preparation of the tilled layer, and in most cases drainage work. In the future the gaining of new lands will be limited to the vicinity of new industrial projects. This is essentially a zone of forestry and hunting.

In the subzones of the tayga with turf-podsol soils and in the broadleaf-forest subzone of gray forest soils the soil-climatic conditions are favorable for farming. The tilled area in these subzones in the European part fluctuates between 30 and 40 per cent; in Siberia it drops to 10 or 15 per cent. In this subzone, agriculture and forestry are almost equal in importance. With respect to heat resources, it is possible to cultivate all the cereals, including medium and late wheat varieties, early corn for grain and late corn for silage and green fodder, all the vegetables, potatoes, flax, perennial grasses, hemp in the south and sugar beets in the west.

The western part of the subzone is warmer than the eastern, and has a longer growing season. Here intertilled crops are possible, and fallowing for green manure is effective.

A large part of the subzone of turf-podsol soils is excessively moist after spring. On the flat watersheds and gentle slopes with loamy and clayey soils and in the lowlands the excess surface waters stagnate, delaying the beginning of spring planting and drawing out the planting period. Here, too it is important to apply methods for regulating the water regime of the

plowland, such as strip plowing, keeping separate furrows to drain off the excess water, furrowing of plantings, etc. Deep plowing and loosening of the horizons under the tilled layer are also advised. By improving the absorption of surface waters, these methods make possible earlier planting and create reserves of physiologically useful moisture for the warm summer season. The deepening and cultivation of the tilled layer in this zone are also important for increasing the biological activity of the soils and providing reserves of mobile forms of nutrients. Of great significance is liming in doses differentiated according to soil acidity, and the practice of grass sowing (clover and grass mixtures), the introduction of abundant doses of organic and mineral fertilizers. Especially effective here is the crop-rotation system that was worked out precisely for this subzone by Academician V. R. Vil'yams.

The subzone of turf-podsol soils abound in peat bogs and swampy lowlands. It contains vast swamp regions with potentially rich peat bogs such as Pripet Marshes, the Meshchera, the Lovat lowland, the Upper Volga lowland, a number of lowlands in the Baltic republics, the Vyatka-Vetluga woodlands, the swamps of the northern part of the Baraba and other regions of Western Siberia, and swampy and peaty areas on river floodplains. Draining of these swampy and swamplike areas will convert them into fertile lands with stable yields of many crops, mainly vegetables and perennial grasses. This is shown by the experience in Belorussia, the Ukraine, the Baltic republics, and the northwestern and central oblasts. This is the vast potential reserve of agricultural land of this subzone.

The whole subzone of turf-podsol and gray forest soils may be regarded as a vast reserve for expanding the agricultural area of the Soviet Union in the next few years.

The subzone also faces such tasks as the cultivation of the new plowland, the elimination of soil acidity, the removal of boulders, and the elimination of excessive soil moisture. A very important question is the combining of small plots of plowland and other agricultural land hampering the wide application of mechanization. These small plots are in part an inheritance from the old private farming, which resulted in an unsystematic alternation of plowland and forest, and in part are due to natural conditions, the frequent alternation of dry and swampy lands. The rational organization of the territory with the correct distribution of forests, plowland, hayfields and pastures according to the relief in this zone has immense economic significance. A considerable amount of new land could be gained here from forests and brushland. These possibilities are especially great in Western Siberia, where the tayga forests in the subtayga zone are located on highly fertile gray and dark-gray forest soils. But in gaining new land from forests and brushland we must preserve the proper relationship between forest and agricultural land, keeping an optimum percentage of forest cover.

An effective measure will be the draining of swamps and their conversion into fertile agricultural land. A number of large tracts of swampland

have been named above. However, it will perhaps be more important to drain small sections of swampy and waterlogged soils that impede the proper use of the new plowland and hayfields and lower their fertility.

A major task in this zone is the improvement of natural hayfields and pastures. According to estimates by N. N. Pel't (1959) and P. M. Zemskiy (1959) animal husbandry in this zone requires at least 15 to 20 million hectares of improved hayfields and pastures of sown perennial grasses. This task will require a great deal of drainage work.

On the whole, the subzones of the turf-podsol and gray forest soils may be regarded as a region of future development of virgin lands. But unlike the steppe regions where virgin lands have been developed on a large scale since 1953, the program in the forest zone is considerably more complicated, and requires higher capital outlays and a large volume of reclamation work.

Furthermore, agricultural land should be expanded without disturbing the interests of forestry and water management. The development of new lands in this zone must therefore follow a carefully laid plan providing for the interests of various segments of the national economy.

The Eastern Siberian tayga-permafrost oblast of gley-permafrost, podsol-permafrost, turf-podsol, pale-yellow-podsol, permafrost-tayga and gray forest permafrost-tayga and gray forest permafrost soils has its own agricultural characteristics. The main aspects are the extreme continentality of the climate, the low winter temperatures with little snow cover, deep freezing of the soils, resulting in the wide distribtuion of permafrost over the greater part of the oblast, and, in its southern parts, the existence of lengthy seasonal ground frost. This circumstance, by substantially changing the course of the soil-building processes, results in the development of local structural peculiarities of the soil cover. The protracted freezing of the soils further shortens the brief growing season in this oblast. When the permafrost areas are cleared and plowed up, they begin to thaw out and in some cases there is a local development of swampiness, caused by the flow of surface water into places where the permafrost layer has been lowered. In the dry Lena-Vilyuy depression this factor is utilized to gain additional moisture for the crops by distributing the plowland in small sections among the virgin lands.

The agricultural possibilities of the oblast, apart from permanent and long seasonal frost, are complicated by the fact that a large part of the oblast is occupied by mountains whose elevation diminishes the heat resources and whose relief prevents the development of farming. On the whole, it is possible to cultivate a more limited range of crops, less heat-loving than in similar latitudes of the central-tayga oblast.

The whole technique of crop cultivation in this zone must be designed to warm the soils. The wide occurrence of acid soils requires liming except in a number of areas where limestone parent rock and carbonate soils are

widespread. In the Lena-Vilyuy depression, the presence of solonets and solodized (leached) solonets soils requires reclamation, in particular gypsuming. Of substantial importance are grass sowing, introduction of organic fertilizers and the use of mineral fertilizers, especially in the early spring when the soils are still not sufficiently heated and biologic activity has not begun.

The leading economic activities in the oblast as a whole are reindeer raising, forestry, hunting and selective farming with cultivation of early ripening crops. Farm machines should be adapted to local climatic conditions. This also applies to the adjacent provinces of the other Siberian oblasts.

The Far Eastern meadow-forest oblast of turf, acid unpodsolized and turf-podsol soils also has limited farming possibilities. Here mountains predominate, and the plains provinces of Kamchatka and the Lower Amur are heavily forested and in many places swampy and subject to summer floods, caused by the summer monsoon rains. Conversion to farming would require drainage work and clearing. The range of crops is limited to early ripening varieties. It is evident that farming and animal husbandry will be limited largely to areas where population is concentrated because of mining activities.

The western brown-earth-forest oblast with podsolized and typical brown-earth soils has its main territory in Western Europe, in the latitudes of the Soviet chernozem steppes. In the USSR, it is represented by the small Transcarpathian plains province with brown forest podsolized surface-gleyized and meadow-brown soils, and by a series of mountainous provinces in the Carpathians, the Crimea and the Northern Caucasus.

The Transcarpathian plains province, having a moist, warm climate (sum of active temperatures 2,900 to 3,000°), presents possibilities of cultivating a wide range of crops, corn, all the cereals, vegetables and fruit crops and perennial grasses. The long growing season makes possible intertilling of crops. Soil fertility can be raised by drainage to eliminate temporary surface waterlogging, by subsoiling, by liming of acid soils, and by large doses of organic and mineral fertilizers.

The mountainous provinces of the oblast are regions of forestry, animal husbandry and selective farming at places having a relief suited for plowing.

The central forest-steppe and steppe oblast with dark-gray forest soils, podsolized, leached, typical and ordinary chernozems and dark-chestnut and chestnut soils occupies a vast territory and is the main farming zone in the USSR, with wide development of a grain crops, animal husbandry and various industrial crops. The southern and eastern parts of this oblast contain the virgin lands opened up in the last few years.

In the western and Caucasus foreland provinces of this zone the milder

and more humid climate favors winter and intertilled crops, corn, sugar beets, sunflowers and other crops. Toward the east the conditions are more favorable to spring crops, with the same range of crops.

The plains steppes favor mechanized farming and this oblast has the largest percentage of cultivated area and the lowest percentage of forest cover of any part of the USSR. Gullying occurs in districts with dissected relief -- the Dnieper, Middle Russian and Volga uplands, the Urals foreland and Trans-Urals plateau and other districts of elevated relief. Wind erosion is common in the eastern regions of the oblast. The agriculture of the respective regions of this oblast thus requires anti-erosion measures. Of great significance is the planting of shelter belts to accumulate snow and weaken the desiccating effect of the spring and summer winds.

The oblast is often subject to droughts, especially in its eastern and southern regions. Measures for accumulating and conserving soil moisture are therefore important here.

Solonets and solonets-like soils are locally distributed among the normal fertile soils of the steppe oblast. Within the chernozem subzones the solonets soils are distributed on lowlands with a high water table and are subject to the soda type of salinization. In addition to special cultivation methods, snow accumulation and grass sowing, such soils require the application of gypsum to replace the exchangeable sodium. Farther south, among the dark-chestnut and chestnut soils, solonets and solonets-like soils become more prevalent. There the salinization is of the chloride-sulfate type with accumulation of gypsum when the carbonates lie near the surface. The main method of reclaiming the solonets soils of the chestnut zone is deep tillage designed to remove gypsum and lime from the deeper horizons, use of two or three-tier plows, subsoiling and deep breaking. In combination with the winter fallow and snow-retaining methods, deep tillage creates conditions for improving solonets soils by sowing grass and using organic fertilizers. On dark-chestnut solonets-like soils the application of gypsum in small doses (200 to 300 kilograms per hectare) at the time of sowing produces a good effect.

Of practical significance throughout the zone is the selective irrigation of vegetable and fruit crops and, in its southern parts, also perennial grasses and corn. In the Eastern Siberian part of the oblast protracted seasonal ground frost appears, requiring its own peculiar cultivation technique.

The eastern brown-earth-forest oblast with brown forest and turf-podsol soils has climatic conditions favorable to farming, such as winters with little snow, a dry spring and a very wet summer. It permits cultivation of a wide range of field crops -- spring wheat, soybeans, corn, vegetables, potatoes. Rice thrives in the Ussuri area.

The seasonal distribution of precipitation interferes with the accumulation

of moisture in the soil for the spring season and produces waterlogged soils in the second half of the summer. This situation requires leveling of field surfaces, strip plowing and the furrowing of fields to carry excess water into a network of larger ditches that carry them into reservoirs. The soil should be deepened periodically to a depth of 40 to 50 cm. to raise the water-holding capacity of low-permeability soils. Waterlogging of the soil surface must be combated everywhere in the plains sections of this oblast. The struggle against erosion becomes important on slopes of noticeable steepness. A number of areas of this oblast require the use of micro-fertilizers (iodine, manganese) to prevent diseases in man and animals. Flooding must be combated in the valley sections. In the eastern brown-earth oblast considerable areas can be selected for new agricultural development. But the preparation of new areas for cultivation here requires reclamation work such as clearing of woods and brush, draining waterlogged areas and protecting them against flooding.

The desert-steppe oblast of light-chestnut, brown, gray-brown soils and low-carbonate foothill serozems (gray soils) occupies somewhat less area than the steppe oblast of chernozem and chestnut soils, but it is still very extensive. A warm, dry climate is characteristic of the oblast.

The heat resources of the oblast permit the cultivation of a wide range of crops (sum of active temperatures from 2,800 to 4,000°), but farming possibilities are limited by the deficiency of moisture. The annual precipitation is less than 250 mm., and in the greater part of the oblast 100 to 200 mm. Farming is confined to local depressions receiving additional moisture from surface runoff from the surrounding areas. Solonets and solonets-like soils and large areas of sands are widespread.

Because of the limited farming possibilities, this oblast emphasizes livestock grazing on rangelands and hayfields.

Farming possibilities in the oblast can be expanded through special dry-farming procedures and by selective irrigation. Dry farming is possible on a small percentage of the area. It can be developed through deep tillage designed to improve the solonets properties of the soil cover and to accumulate moisture. Of decisive significance in the accumulation of soil moisture is the employment of winter fallow (even to the extent of a two-field crop rotation), coulisse fallow (in which a tall-stemmed cover crop acts as a snow fence) and the planting of windbreaks. The ratio between the plowland area, on which the soil moisture can be increased by snow retention to the total area has not yet been studied. But, taking into account the small amount of snow, it cannot be great. Snow-retaining methods can probably provide sufficient reserves of moisture for plowland constituting not more than a fourth or a fifth of the total area.

The prospects for increasing the productivity of the land of the desert-steppe and desert oblast open up the possibility of establishing sown hayfields and pastures. Deep plowing, with fallowing for one to two years,

makes it possible to create good stands of perennial grasses such as crested wheatgrass, Kochia prostrata, yellow alfalfa, with crops of 1 to 1.5 tons per hectare instead of 200 to 300 kg. on natural pasture.

Considerable areas in this oblast can be irrigated with water from the Volga, the Ural or other rivers and converted into oases of irrigation farming with cultivation of a wide range of relatively warmth-loving crops. Water-hole irrigation can be used for hayfields, pastures, spring grains and corn. This kind of irrigation is the cheapest, does not disturb mechanized work and at the same time gives a considerable increase in yields. In irrigating here, salinization of the soil has to be combated at many places. Sandy areas must be stabilized and used as pasture with a proper rotation.

The piedmont zone of low-carbonate serozems is the zone of irrigated oasis farming with cultivation of sugar beets, rice, kenaf, corn, grasses and southern fruits. Throughout the oblast water-spreading systems must be provided for desert rangelands.

The high-mountain desert oblast of the Eastern Pamir and the Central Tien Shan has no farming significance. It is utilized for high-mountain livestock grazing. In certain sheltered and warmer places a limited range of crops can be grown.

The subtropical humid-forest oblast of yellow and red soils reaches into the USSR in two small areas in the southern Black Sea coast and in the Lenkoran' area of Azerbaydzhan. These areas are suitable for the growth of subtropical crops, such as citrus, tea and tung nuts. The possibilities of expanding the agricultural area are restricted by the mountainous relief and the swampiness of the Colchis lowland. In the latter, drainage work has been going on for many years, followed by silt deposition and planting of subtropical crops. The mountain slopes could be used for farming by terracing and other anti-erosion measures.

The subtropical temperate-warm xerophytic-forest oblast of brown and gray-brown soils occupies the medium-elevation areas of Transcaucasia. With a warm climate and water and heat resources varying with elevation, this oblast has diversified conditions and possibilities for agricultural utilization. Viticulture and intensive fruitgrowing are important in the warmer low-lying regions. The steppe conditions of the low and medium-mountain belt are used for grazing; forestry is widely developed.

In the low-lying areas plowland could be expanded by irrigation. In the higher areas the land must be properly apportioned between forest and plowland along with anti-erosion measures, and the productivity of the fodder area must be raised. Forestry must be further developed in every possible way.

The subtropical temperate-warm desert-steppe and desert oblast with serozems and southern gray-brown soils occupies the vast Turanian lowland, the surrounding mountains and the Kura-Aras lowland in Transcaucasia. This

is an oblast of southern deserts with their serozems, gray-brown soils and large areas of sand. The oblast has enormous economic significance for the USSR, accounting for all the cotton produced in the country.

The sandy deserts are used and must continue to be used for karakul raising. Desert ranges must be provided with the proper pasture rotations and small nodes of irrigation farming must be established for growing vegetables and fodder stocks for the winter season.

The piedmont section has the water resources of the Syr-Dar'ya, the Amu-Dar'ya and other river systems. It contains many cotton fields, vineyards and fruit orchards. The irrigated area could be increased by two or three times through fuller utilization of the water resources of the Amu-Dar'ya and Syr-Dar'ya. New irrigation systems are under construction: the Karakum Canal, the Golodnaya Step' (Hunger Steppe) system and the Central Fergana. Irrigated oases will continue to emphasize cotton growing, fruits, vegetable crops and silk growing. The mountain slopes in the piedmont favor dry-farming of grain crops. Forestry and animal husbandry predominate at higher elevations.

The preceding brief description of the natural soil-bioclimatic oblasts must be taken into account in working out rational cropping systems.

THE PRESENT STATE OF THE CHINESE IRON AND STEEL INDUSTRY

By S. A. Nikolayev and L. I. Molodtsova

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(The authors of this article are students at the Geography Faculty of Peking University. They have written the article on the basis of Chinese sources and personal familiarity with China's industrialization process. They have also taken part in the field work of the economic geographers of Peking University in the Yangtze valley.)

The Chinese people have marked the first decade of their republic with great ceremony. In the last ten years great successes that cannot be overestimated have been achieved in all fields of China's economic and cultural development. The great and potentially rich, but previously backward and economically dependent country has now joined the ranks of the strongest and economically most developed states of the modern world.

The Chinese People's Republic is a good example of the great successes a people can achieve once it throws off the shackles of colonialist oppression and creates conditions under which man can no longer be exploited by man.

One of the most convincing examples of the great success achieved by the Chinese people in the first decade of its free existence is the development of the Chinese iron and steel industry, which was extremely backward in the past.

In 1949, when the Chinese People's Republic was formed, the country produced 252,000 tons of pig iron, 158,000 tons of steel and 141,000 tons of rolled products. (The Present and Past of the Iron and Steel Industry ... (Chinese title not available - Editor, S. G.), statistical publication, Peking, 1958, p. 8). The rehabilitation and rapid expansion of the industry became one of the main objectives of economic construction. By the end of 1952 the production of iron and steel exceeded all past levels ever reached in China. The emphasis in the first five-year plan (1953-57) was on the utilization of existing capacity and its reconstruction and expansion. For example, out of the total investments in the iron and steel industry in the first five-year plan, 29.6 per cent went into new construction and 70.4 per cent into rehabilitation and reconstruction of old enterprises.

In view of the fact that new construction in the interior of the country was only just beginning and the iron and steel industry of the coastal regions continued to grow, there were no substantial changes in the distribution of the industry during that period. However iron and steel output sharply rose during the first five-year plan and its share in the total value of industrial output increased from 1.7 per cent in 1952 to 5.6 per cent in 1956. There were increases in the output of high-quality steel, the range of products expanded and the technical level of production rose substantially. These early advances laid the basis for further development of the industry during the second five-year plan. At the same time geological exploration resulted in an expansion of the raw material base for the industry. The reserves of previously known deposits (Anshan, Süanhwa and Tayeh) increased and, more importantly, many new iron-ore deposits were explored, making it possible to establish several iron and steel plants.

The Geological Monthly of January 1958 (The title translation apparently refers to the Chinese geological monthly Ti-chih Chih-shih or, in the official Chinese transcription, Dizhi Zhishi -- Editor, S. G.) gave the total explored reserves as of January 1, 1957 as 7.9 billion tons (reserve categories A+B+C_1 - 3.9 billion tons, C_2 - 4 billion tons). The July 1958 issue of the same journal reports that at least 9.4 billion tons of iron ore are to be explored during the second five-year plan (1958-62), so that by 1962 the industrial iron-ore reserves are expected to amount to at least 15 billion tons. The notion, prevailing in the past, that China is poor in iron ore has thus been completely refuted.

The various types of ores in the total explored reserves as of 1957 are shown in the following table (Geological Monthly, 1958, No. 1):

Magmatic deposits	3 per cent
Contact metasomatic and hypothermal and mesothermal deposits (rich ores)	14 per cent
Special hypothermal and mesothermal deposits	10 per cent
Sedimentary deposits (40 to 43% Fe)	18 per cent
Metamorphosed iron ores (Anshan type, 32-33% Fe)	50+ per cent

The remaining 5 per cent include several other small groups of iron ores.

The metamorphosed ores of the Anshan type occur in southern Liaoning, in Hopei, Shansi (Wutai) and Inner Mongolia. The recently discovered large deposits of Kintiehshan (Chin-t'ieh-shan) in Kansu and Sinyü in Kiangsi also belong to that type. The rich contact and hydrothermal iron ores are found mainly in the lower and middle Yangtze valley, in Chekiang, Fukien, Kwangtung, in the Taihang Mountains, in Shantung and Sinkiang. Although relatively small, these deposits can supply large and medium-size iron and steel plants.

The progress of geological exploration work in 1958 resulted in considerable changes in the geographical distribution of known iron-ore reserves. Especially many new discoveries were made in the provinces of the Yangtze basin. For example, there was a substantial increase in the explored reserves of Szechwan. A new deposit was found in Kweichow (in the Tsunyi area), and a large deposit of iron pyrites was found in the western and central parts of that province. A large iron ore deposit was found in western Hupei in the mountains south of the Yangtze gorges. The known reserves at Tayeh have doubled. The deposit of sedimentary-metamorphic ores found in the Sinyü area of Kiangsi covers an area of 400 sq. km. and has an iron content of 30 per cent.

In the northern part of the country the new discoveries are concentrated in Hopei (the Pingshan-Holu area, near Shihkingshan), in Honan (the Tameichai area in the north) and to a lesser extent in Shansi (the Siyang-Mengsin zone). Two large deposits of sedimentary-metamorphic ore with an iron content of 40 to 60 per cent have been found in Kwangtung (Loyüan-Isin area). Other iron-ore deposits in Kirin, Hunan, Shantung, Chekiang and Fukien turned out to be larger than previously thought (Geological Monthly,

1958, Nos. 7,9,10 and 11; Materials in Economic Geography (Chinese title not available -- Editor, S. G.), 1958, Nos. 1 and 2). Recently very large deposits of iron ore were found in the Yangtze basin, especially south of the river.

While China's iron-ore reserves were uncovered mainly in recent years, its wealth in coal was long known although no exact data on reserves were available. In 1957 China's total coal reserves were estimated at 1.2 trillion tons. The explored reserves as of the end of 1956 were 33 billion tons (A_2+B+C_1) and 68.7 billion tons in the C_2 category, putting China in third place in terms of known coal reserves. The basic Chinese coal grades (in order of increasing volatility) are shown in Table 1.

Table 1

Coal Grade (excluding brown coal)	% of total reserves (A_2+B+C_1) as of January 1, 1957
Lean (subanthracite)	14.79
Coking coal	8.88
Fatty steam coal	25.43
Gassy subbituminous	11.02
Long-burning subbituminous	17.00

Changes in the distribution of coal reserves are shown in Table 2 (Geological Monthly, 1958, No. 4).

Table 2

Regions	1950	1957 ($A_2+B+C_1+C_2$)
	% of total reserves	
Manchuria	4.59	6.45
Inner Mongolia	1.54	25.27
Hopei	2.93	5.54
Shantung	0.54	1.93
Shansi	50.20	31.81
Honan	2.54	6.97
Shensi	22.74	5.25
Kansu	0.22	2.51
Tsinghai	0.09	0.96
Sinkiang	10.21	3.62
Szechwan, Yunnan and Kweichow	2.67	2.09
Taiwan	0.13	--
9 provinces of South China	1.60	7.60

The table shows that Inner Mongolia and North China account for three-fourths of the country's total reserves. The data reflect mainly the results of exploration for coal, which until now has been concentrated in North China. This area also offers the fullest range of coal grades and a large part of the coking coal, which is shipped from there to other parts of the country. Among the southern provinces, Kweichow is best supplied with coal reserves, including coking coal.

A feature of the distribution of iron ore and coal in China favoring the establishment of an iron and coal industry is the close proximity of these raw materials. Such a situation exists in southern Liaoning, in North China, in Kweichow and even in many parts of South China, which is generally poor in coal.

As far as manganese and other ferroalloys are concerned, China's reserves are adequate. In reserves of tungsten, antimony, tin, molybdenum and mercury, China is in first place, and in manganese reserves second only to the Soviet Union.

In 1958 China was given the assignment to make a "great leap forward" in the iron and steel industry and to double steel output in one year from 5.35 million tons in 1957 to 10.7 million tons in 1958. In order to fulfill the goal, it was decided to combine the development of a large-scale modern industry with traditional craft methods of iron smelting, known in China since antiquity. (Until the liberation in 1949, peasant needs were covered largely by iron smelted by craft methods.) A small iron smelter with a capacity of a few cubic meters or more can be built quickly and cheaply with local materials. In the summer and fall of 1958 countless small iron and steel furnaces were built in China. Millions of people worked night and day around these furnaces and in small iron-ore and coal diggings. According to data made public in October 1958, about a million of such furnaces had been built.

These furnaces made an especially large contribution to iron production. In November 1958 they supplied three-fourths of China's pig iron and 40 per cent of China's steel. During brief time intervals the craft output of iron reached an unprecedented volume. For example, in a three-day period at the end of October the province of Hunan produced 3 million tons of iron (Jen-min Jih-pao or Renmin Ribao, November 2, 1958). Such a production level, of course, could not be maintained.

The rapid growth of small iron smelters solved the raw-material supply problem for many steel smelters and made it possible to reduce long hauls of iron. But craft smelting of iron, and especially of steel, has serious disadvantages. Irregularity of production causes difficulties in transportation, interrupts the flow of iron to large steel plants and wastes manpower. A second disadvantage is the low quality of output. Iron smelted in small craft furnaces has a high sulphur and phosphorus content, making it difficult to use in open-hearth furnaces. Chinese steel men have developed

methods for using craft iron, but the poor quality of such iron is still a serious problem. In addition, the Chinese have developed ways of converting the high-sulphur, high-phosphorus iron into high-strength iron of spherical structure that can be used in the machine-building industry.

At the end of 1958 began a new stage in the development of craft methods in the iron and steel industry. Large numbers of small furnaces were consolidated into small integrated iron and steel plants, including even the utilization of chemical by-products. The location of these plants and the best furnace designs were based on the rich experience accumulated during the mass movement of 1958. The new small plants have supervisory and technical personnel who are no longer engaged in production. Thus began a process of eliminating a countless number of small furnaces and concentrating them around certain centers best supplied with raw materials, manpower and transportation lines. In the future those plants having the most favorable conditions for further development will be expanded into modern medium-size and even large enterprises.

The process of replacing the tiny iron smelters with small and medium-size blast furnaces was basically completed by the end of 1959. As a result of technical improvements in these blast furnaces, their total pig-iron output was almost equal to that of the large modern blast furnaces. At the same time the quality of output improved and coal consumption was reduced.

The 1958 production plan was fulfilled ahead of schedule. Out of the 11 million tons of steel produced in 1958, about 3 million tons were made in local plants of the craft and modern types. The remaining 8 million tons came from large modern plants, of which Anshan produced 4.5 million tons, Shanghai 1.2 million tons, Chungking 0.8 million tons, Hwangshih (near Tayeh) and Taiyüan 0.5 to 0.6 million tons each, and Tangshan and Tientsin 0.3 to 0.4 million tons each. The steel capacity of all these plants was expanded in 1958. In most cases the expansion was designed to convert the enterprises into integrated iron and steel plants. Blast furnaces were under construction in the Chungking and Shanghai steel plants, which in the past relied on outside pig iron; and steel departments were being added to the Penki and Maanshan iron plants. However the expansion program in the large modern plants got under way only in October 1958, so that production increases in 1958 resulted mainly from greater productivity of existing equipment rather than from expanded capacity.

Among the capacity added in 1959 were the first blast furnace and two coke batteries at the new Wuhan plant, as well as the first sections of the plants at Ocheng in Hupei, Lienyüan (former Lantien) in Hunan, and Canton in Kwangtung. The first steel was produced by the Kunming steel plant and the first pig iron by the Huhehot plant of Inner Mongolia. Other iron and steel plants went into operation at Nanking, Hofei and Mutankiang. The new construction was based almost entirely on the expanded capacity of the Chinese machine-building industry, which from January to

November 1958 produced 20,000 blowing engines, 10,000 sets of blast-furnace equipment and 3,000 sets of converter equipment (Jen-min Jih-pao, December 22, 1958).

By the end of 1958 the total steel-making capacity was 20 million tons (Jen-min Jih-pao, February 2, 1959). It meant that 14 million tons of new or expanded capacity had been added during the year.

Pig-iron production greatly exceeded steel output in 1958 and that situation is expected to continue in the near future. Several factors are involved. One is that the scrap supply is still very small in view of the relative youth of the Chinese iron and steel industry and virtually all the steel is made from pig iron. In addition a large amount of iron is used directly in industry without being converted into steel. In 1957, for example, 25 per cent of the pig iron was made into wrought iron, and that percentage has hardly diminished since then.

The increase in steel-making capacity in 1958 was due largely to the construction of a large number of converters of various sizes. The stress on the Bessemer process is explained largely by the fact that the unit cost of converter capacity is much lower than that of open-hearth capacity, and converters can be built more rapidly than open-hearth furnaces. The small amount of available scrap and the large percentage of high-sulphur, high-phosphorus iron supplied by the small furnaces are other factors favoring use of the Bessemer process.

There was also an increase in the output of rolled products, and the product range rose from 5,000 items in 1957 to 6,000 in 1958. However, rolling capacity began to lag behind the rapid increase in pig-iron and steel capacity. China was short of heavy rails, sheets, seamless pipe, wire and some other steel products. Therefore the 1959 plan called for more than a doubling of rolled-products output and an increase in the product range by 2,000 items. Fulfillment of that goal required continued reliance on the policy of "walking on two legs," meaning the simultaneous construction of centrally controlled and local enterprises, and large and small enterprises. One major source for increasing the output of finished steel products was improved productivity of existing equipment, which was to account for 60 per cent of the total 1959 goal. It meant that productivity of existing equipment had to rise by 50 per cent compared with 1958 (Jen-min Jih-pao, January 7, 1959).

The eighth plenary meeting of the Chinese Communist party's Central Committee set the 1959 steel production plan at 12 million tons, not counting local production by simple methods for local needs. It meant that steel production in modern furnaces was to increase by 50 per cent. In the first half of 1959, China produced 9.5 million tons of pig iron and 5.3 million tons of steel (not counting steel smelted by simple means).

The general increase of iron and steel production was accompanied by rtain shifts in geographical distribution although most of the output continued

to originate in the coastal areas. For example, Liaoning accounted for 44 per cent of China's steel output in 1958 (Ching-chi Yen-chiu or Jingji Yanjiu, 1958, No. 8), Tientsin and Tangshan 7 per cent, Shanghai more than 10 per cent, making a total of 60 per cent for the coastal areas. However, it represents already a considerable shift from 1952, when these areas accounted for 85.8 per cent of the total steel output (The Present and Past of the Iron and Steel Industry - - - , p. 5). There was a considerable increase in the output share of plants in the middle Yangtze valley (Chungking and Wuhan-Tayeh) and at Taiyüan. The process of achieving more uniform distribution of the iron and steel industry will continue as the hundred or so construction projects now under way are completed. (The projects are mainly in the iron and steel industry, but include also nonferrous enterprises. Jen-min Jih-pao, February 7, 1959.)

Serving as the basis for the new distribution of the iron and steel industry is the idea of establishing integrated industrial systems in each of the seven economic regions of China. These regions have been delimited with a view to being supplied with an adequate raw-material base for industry and having at least one or two economic centers that could serve as levers for further industrial development of the region as a whole. These regions with their 1956 populations are as follows (the most developed provinces are underlined): Manchuria (Liaoning, Kirin, Heilungkiang; population: 50 million); East China (Shantung, Kiangsu, Anhwei, Chekiang, Fukien, Kiangsi, and the city of Shanghai; population: 190 million); North China (Hopei, Shansi, Inner Mongolia, and the city of Peking; population: 71.3 million); Central China (Honan, Hupei, Hunan; population: 112 million); Southwest China (Szechwan, Yunnan, Kweichow; population: 82 million); South China (Kwangtung, Kwangsi; population: 57 million); Northwest China (Shensi, Kansu, Ningsia, Tsinghai, Sinkiang; population: 39 million). Each of these regions is expected to develop a modern industry corresponding to the regional population and natural resources and including all basic sectors with a specialization insuring a rational division of labor among regions. Therefore each region must also have its own iron and steel industry.

The distribution of iron and steel plants is regarded as an especially important question because the distribution of nearly all other sectors of industry depends on it. The establishment of large steel centers, surrounded by a complex of enterprises of heavy and light industry, is the prerequisite for the development of the entire regional economy. Therefore China faces the task of setting up one or more steel centers in each economic region. Several centers have already been selected. For example, Anshan for Manchuria, Paotow for North China, Wuhan for Central China, Kiuchuan for Northwest China, Sichang and Chungking for Southwest China, Maanshan and Shanghai for East China, and Shiukwan, Canton and Liuchow for South China. The number and size of these plants will depend on local conditions. They will be more numerous and larger in Southwest, Central, North and East China; fewer in number and smaller in Northwest and South China. But each region will have at least one plant capable of supplying the region with a broad range of steel and steel products. Each province or autonomous

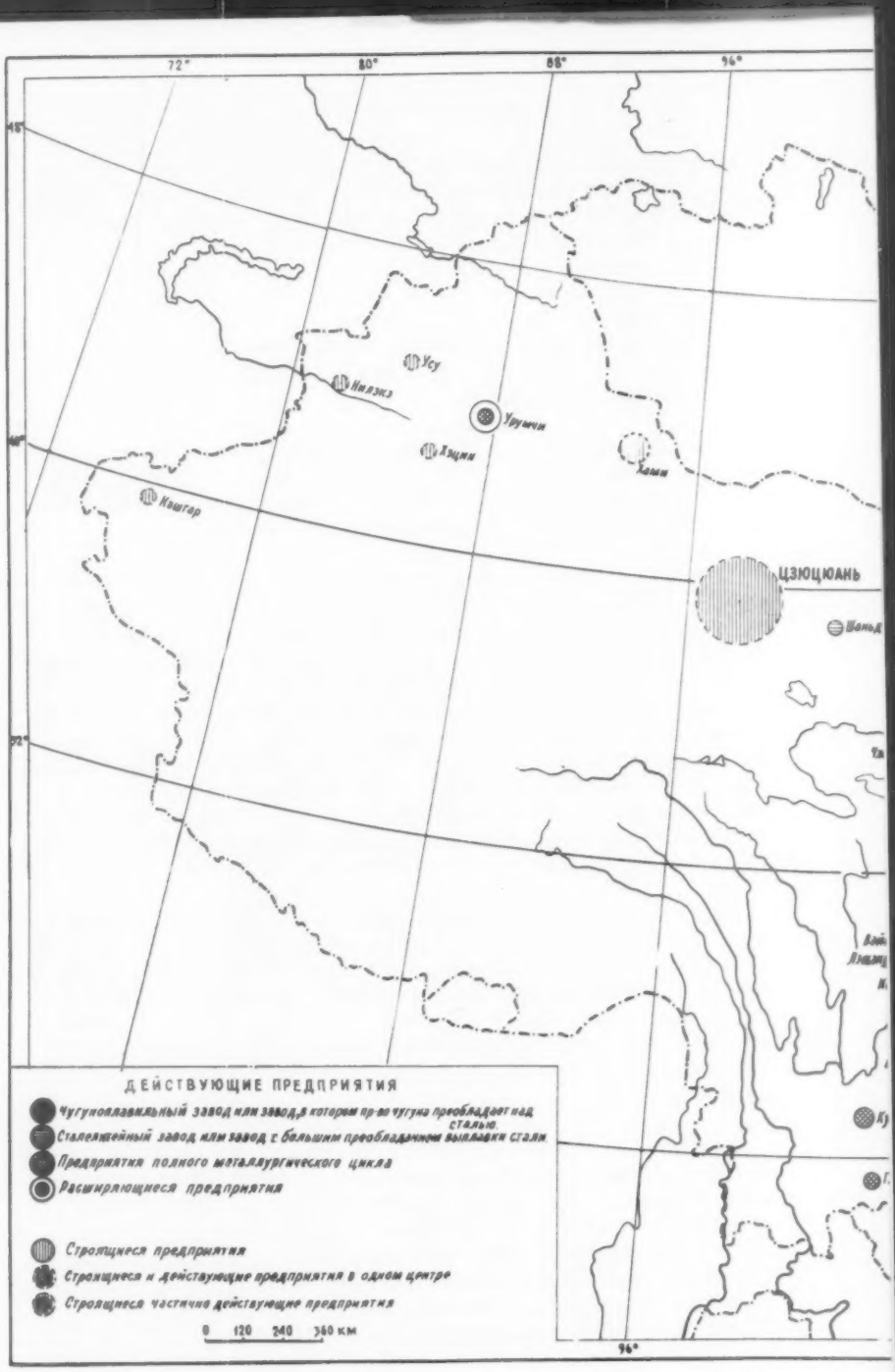
region is expected to have one or more large steel plants with a capacity of one million tons. Administrative units at the hsien level will continue to establish small plants through the consolidation of small local furnaces or through new construction. The advantages of such small plants are in the short time needed for construction, the small capital investments and the simplicity of equipment. In addition, they make possible the use of small, scattered iron-ore and coal deposits. Such small plants are designed to meet the needs of a commune or group of communes. (For a discussion of the principles of location of such plants, see Hsin Chien-she or Xin Jianshe, 1958, No. 10.)

The above-mentioned location principles are already being put into practice. It may be useful to give a short description of the present state and prospects of development of the iron and steel industry in each of the seven economic regions (See map on Pages 64 and 65).

Manchuria contains Anshan, the heart of the Chinese iron and steel industry and the training ground of iron and steel workers for other parts of the country. In 1958 steel output at Anshan was 4.5 million tons, or 42 per cent of the national total (Ts'ai-ching Yen-chiu or Caijing Yanjiu, 1958, No. 8). Anshan has a favorable location near iron mines and the coal centers of Fushun and Penki and in an area with a dense rail network. Anshan's disadvantage is the low grade of its ores (30 to 40 per cent iron). A shortage of concentrators has resulted in disruptions of the raw-material supply. In 1958 the first section of China's largest concentrating and sintering plant (at Tunganshan) went into operation in the Anshan area, and construction of a second plant began near by at Kungchangling. The concentrating capacity thus increased by more than 25 per cent.

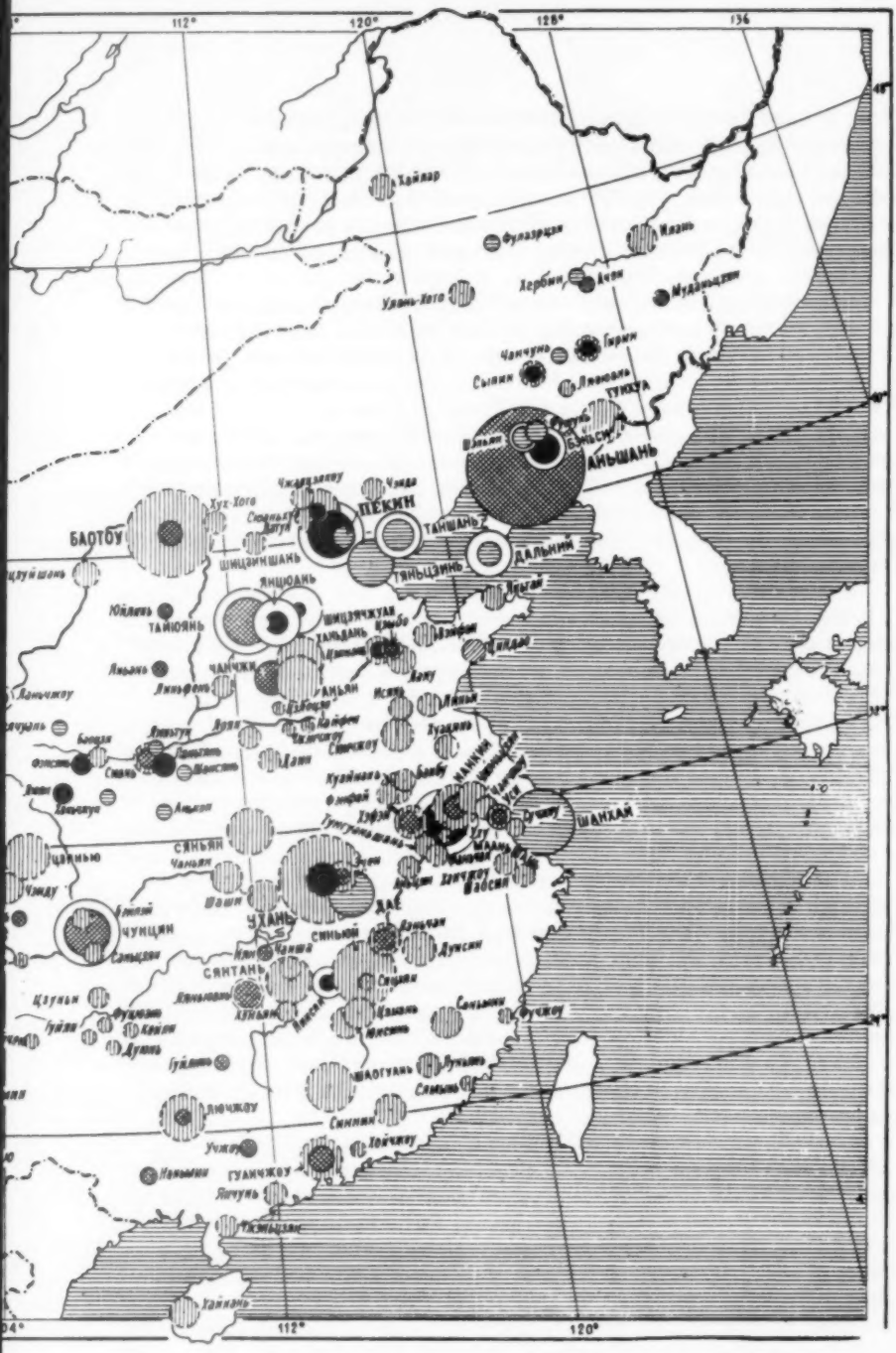
Among the projects completed in 1958 at Anshan were Blast Furnace No. 10 with a capacity of 1,500 cubic meters and two open-hearth furnaces, each with a capacity of 600 tons, making them the largest open hearths in the world. By the end of 1958 Anshan had a steel-making capacity of 6 million tons a year. Despite its absolute increase, Anshan will gradually produce a lesser percentage of China's steel as other regions obtain their own steel plants; however, it will continue to be the principal steel center of Manchuria.

Anshan is the central link of a group of iron and steel plants in southern Liaoning, including the special-steel plant of Fushun, the iron-smelting plant of Penki and the steel plant of Dairen (Talien). These plants supply steel to the machine-building centers of Manchuria and other parts of China. The high-grade steels obtained at Fushun and Dairen from low-phosphorus Penki pig iron are used in shipbuilding and in the electrical industry. The capacity of these plants expanded in 1958. New steel plants are now under construction at Fushun and Tunghwa. Iron and steel production also began for the first time in 1958 in the provinces of Kirin and Heilungkiang, which previously had to obtain their steel from southern Manchuria. In 1958 the province of Kirin undertook to produce 300,000 tons



Legend: Operating Plants

Pig-iron plant, or emphasis on pig iron
Steel plant, or emphasis on steel
Integrated iron and steel plant
Plant being expanded



Chinese Iron and Steel Industry (beginning of 1959)

Plants under construction
Plants under construction and in operation
Plants under construction and in partial operation

of pig iron and 100,000 tons of steel and Heilungkiang pledged the production of 200,000 tons of pig iron and 400,000 tons of steel. (Actually Kirin produced only 36,000 tons of pig iron and 80,000 tons of steel, and Heilungkiang produced 79,000 tons of pig iron and 357,000 tons of steel -- Editor, S. G.) Small amounts of iron and steel are smelted at Fularki, Changchun, Kirin, Szeping, Harbin, Kiamusze, Linkow and Acheng.

The core of the iron and steel industry of North China consists of the following four plants: Shihkingshan iron and steel plant (near Peking), Tangshan and Tientsin steel plants and the Taiyuan iron and steel plant. All four expanded their capacities in 1958. Large Bessemer departments went into operation at the Tientsin and Tangshan plants at the end of the year. At Taiyuan the open-hearth furnaces, blast furnaces and electric furnaces were rebuilt and construction began on a second and third steel plant, to be completed in 1960. The Taiyuan steel complex will be second in size in North China after Paotow when completed. Construction is also under way at Shihkingshan to expand its capacity and convert it into an integrated plant.

In Hopei Province construction is under way on three new plants, whose first sections are already producing up to 600,000 tons of steel a year: at Hantan (based on the coking coal of Fengfeng and the iron ore of Wuan), at Suanhwa and at Shihkiachwang (based on existing small iron smelters). These plants will meet the steel needs of the machine-building industry and other sectors of the economy of North China. Two new plants were opened in Peking in 1958 to supply the machine-building needs of the capital: the Peking steel plant, with a capacity of 200,000 tons, and the Peking steel-rolling plant, with a capacity of 100,000 tons.

The importance of the Paotow iron and steel plant will extend beyond the framework of this economic region. It will supply northern Shansi, Inner Mongolia and Lanchow. The Paotow steel complex is being built along two lines: on the one hand, large, modern units, such as a steel plant with 600-ton open-hearth furnaces and a blast furnace with a capacity of 1,500 cubic meters; on the other hand, the "little Paotow" consisting of small iron smelters, whose combined capacity at the end of 1958 was several hundred thousand tons of pig iron. The first units of the "large Paotow" began production in 1959. The Paotow complex will be a major base for the further westward movement of industry.

East China is at the present time one of the leading areas in iron-ore reserves, which are concentrated in central Kiangsi and the lower Yangtze valley. However, the principal steel-making center is Shanghai, which lacks its own iron-ore supply. Shanghai contains more than a dozen steel plants, of which three account for most of the production. In 1957 steel output in Shanghai was 500,000 tons and in 1958 1.2 million tons. The total steel-making capacity added in 1958 was 2.5 million tons (Chung-kuo Kung-yeh or Zhongguo Gongye, 1958, No. 11). However, for a number of reasons (transportation, raw-material and manpower problems)

the 1959 plan set Shanghai's steel-making goal at only 2 million tons, which would still make it the second largest steel producer (after Anshan). After long discussion it was decided to add blast-furnace production to Shanghai, and construction is now under way. After completion of the program, Shanghai is expected to produce 2.5 million tons of pig iron a year. China's largest city is thus acquiring a distinctive iron and steel industry, which, though scattered in relatively small enterprises through the city, will constitute an integrated production unit. Integration will help solve Shanghai's major problem of high steel production costs, which will be cut from 250 yuan to 150 yuan per ton compared with a cost of 100 yuan at Anshan.

Until recently Shanghai was China's principal producer of small-size finished steel products, used mainly in the construction industry. Under its new program, Shanghai will specialize in high-grade rolled products of complex shapes and large-size products for the city's machine-building industry while the output of high-grade and special steels will be increased.

The second large iron and steel center of East China is the Maanshan plant, based on local high-grade ore and Hwainan coking coal. Maanshan's function is dictated by its location on the Yangtze River near the two large metal-consuming centers of Nanking and Shanghai. Maanshan supplies both iron ore and pig iron to Nanking and Shanghai. The 1958 plan called for 1 million tons of pig iron at Maanshan and the 1959 plan for 2-2.3 million tons. (According to later information, actual 1958 output at Maanshan was 370,000 tons and the new 1959 goal was 810,000 tons of pig iron -- Editor, S. G.) Work is under way to add Bessemer steel production to the Maanshan operations. (The 1959 steel goal at Maanshan was 300,000 tons -- Editor, S. G.)

A whole series of small and medium-size plants is being built along the Yangtze; some of them are already in operation. In addition, medium-size iron and steel plants are being built in almost every province of East China to supply local needs; for example, Tsinan in Shantung; Nanking and Suchow in Kiangsu; Nanchang, Sinyü and Pingsiang in Kiangsi; Sanming and Lungyen in Fukien, and Hwainan and Hofei in Anhwei. In the future, some of these plants (for example, the one at Sinyü) are to be expanded into large enterprises.

Central China offers a favorable combination of Honan coal, Hupei iron ore (Tayeh, western Hupei) and Hunan nonferrous metals. The center of the regional iron and steel industry is the Wuhan-Tayeh area, where the large Wuhan iron and steel plant is under construction, based for the time being on Tayeh iron ore and Fengfeng coking coal. In the future the iron-ore deposits of western Hupei and the coking coal of Pingtingshan will become the principal raw-material suppliers for the Wuhan-Tayeh area. The Wuhan plant already has the following units in operation: the No. 1 blast furnace with a capacity of 1,380 cubic meters, two coke batteries and an electric-power station. A steel-making department is under construction.

(The No. 2 blast furnace, the No. 3 coke battery and three open-hearth furnaces opened later in 1959 -- Editor, S. G.) Upon completion of all sections in 1960, Wuhan is expected to have a steel capacity of 3.5 million tons.

The plant at Tayeh (this plant is actually situated in the near-by city of Hwangshih -- Editor, S. G.) specializes in high-grade steels. At the present time it is the largest plant of that type in China. In 1958 it produced 500,000 tons of steel. Available capacity was considerably in excess of that figure. Near these two centers is a new plant at Ocheng, which went into partial operation in 1958.

A medium-size iron and steel plant is under construction at Anyang in northeastern Honan, which has both coal and iron ore. The plant is scheduled to be Honan's chief iron and steel center. Anyang is also the site of a cluster of small iron and steel furnaces. The principal iron and steel project of Hunan Province is at Siangtan, where a large plant based on local iron ore and coal is expected to start supplying the provinces south of the Yangtze within the next two or three years. Southern Hunan also has a large concentration of small craft furnaces. The rich iron ore deposits of western Hupei, situated near the future hydro-power site of the Yangtze gorges, are to be linked in the future by a railroad and canal with the Pingtingshan coal basin in Honan Province. The western Hupei deposits will in the long-range future supply one of China's largest iron and steel complexes.

Industry, especially heavy industry, is still poorly developed in South China. Until recently the region had virtually no iron and steel production despite the fact that conditions for its development are favorable. The existence of iron ore in Kwangtung Province has been known since antiquity, but a genuine exploration program is only now getting under way. It points to the existence of an ore belt extending from Chiuling in northeastern Kwangtung along the northern and western boundaries to Hainan Island. Iron ore reserves are said to be especially large in the Loting-Sunyi zone.

Canton is at the present time the principal steel producer in Kwangtung. The city makes steel in dozens of small craft enterprises, of which the shipyard is the largest. The first section of the modern Canton iron and steel plant went into operation in 1958 and planned to produce 300,000 tons of pig iron and 250,000 tons of steel by the end of the year. (Actual 1958 production was 190,000 tons of pig iron and 42,000 tons of steel -- Editor, S. G.) By the end of the five-year plan in 1962, the plan is expected to produce 600,000 tons of steel a year.

However, the iron and steel center of the future in Kwangtung Province and all South China will be situated at Shiukwan, a new node of heavy industry that will have a large iron and steel plant based on Linping iron ore and the coal of Linchow (former Linhsien), Kiyan (Ch'ü-jen) and Nanling.

Southwest China includes the mountainous provinces of Szechwan, Yunnan

and Kweichow. The region is rich in mineral resources. According to preliminary data, iron ore reserves amount to 17 billion tons. In the future Southwest China may catch up with East China. Kweichow Province has large coal reserves estimated at more than 200 billion tons.

The iron and steel industry in the Southwest has been in operation for some time but until recently has remained on a small scale. The principal center is Chungking with four plants. The largest plant, No. 101, until recently had a larger steel-rolling than smelting capacity. It produced mainly heavy rails and other rolled products shipped to Manchuria and Central China. Both pig iron and steel ingots were hauled to Chungking from Anshan and Penki, greatly increasing the cost of the final product. In 1958 Plant No. 101 produced 500,000 tons of steel ingots, corresponding approximately to its rolling capacity. Small local furnaces have started to play an important role in the pig-iron supply. Several blast furnaces are under construction at the plant (a 620-cubic-meter blast furnace opened in March 1960 -- Editor, S. G.). Plants Nos. 102 and 103 have no blast furnaces and produce 100,000 to 150,000 tons of steel a year. Plant No. 103 also produces some rolled products. The plants at Sankiang (No. 104) and Pehpei started operations at the beginning of 1959. Their ultimate capacities are about 300,000 tons. In the near future Chungking will become a leading iron and steel center. Its local raw material supply will then become inadequate and it will receive iron ore from the western Hupei basin (along the Yangtze) and from the Tsunyi deposit (along the future Szechwan-Kweichow railroad).

A seamless pipe mill is under construction at Chengtu in Szechwan. Its designed capacity is 550,000 tons of seamless pipe and 70,000 tons of welded pipe. Its steel-making capacity will be 650,000 tons a year. The plant will supply the tubing needs of Szechwan's oil industry (Materials in Economic Geography, 1959, No. 1).

In the more distant future Sichang is expected to become the principal iron and steel center of Southwest China. The Panchihhwa iron-ore deposit, situated near by in the mountainous southwest section of Szechwan, has hundreds of millions of tons of titaniferous iron ore and magnetite. Limestone, dolomite, quartzite and refractory clays are found in abundance around Sichang. Coal will be supplied from the Yungjen basin of Yunnan, the Jungfeng (former Suanwei) basin on the Yunnan-Kweichow border, and from Kiangsi.

Kweichow Province has an especially strong raw-material base. The Tsunyi area contains a large deposit of sedimentary iron ore and several coal deposits. A medium-size iron and steel plant is under construction at Tsunyi and small plants are under construction at Kweiyang and Tuyun. In the future Kweichow is expected to supply the iron and steel needs of Yunnan, where existing plants (at Kunming and Kokiu) are unable to meet the demand. (There will be continued need for imports from Kweichow despite the construction of a rather large plant at Anning (near Kunming), which will apparently become Yunnan's chief iron and steel producer).

The economic region of Northwest China contains vast industrially undeveloped areas. Until recently there was virtually no iron and steel production in that region. A small plant at Urumchi produced 14,000 tons of steel in 1957. At the present time industrial projects are underway in Northwest China both in the east (Lanchow, Sian and Paoki) and in the west (Urumchi, Karamai and some oases). These construction projects require large amounts of steel. Furthermore the rapid development of petroleum production and the need for pipeline and refinery construction also require the construction of a local iron and steel base, for which a site has already been selected at Kiuchuan, on the Lanchow-Sinkiang railroad. The Kintiehshan (Chin-t'ieh-shan) iron deposit, 60 miles southwest of Kiuchuan, has reserves in excess of 500 million tons. A railroad branch will link the mines with the Sinkiang-Lanchow trunk line. If the Kintiehshan deposit proves to be inadequate to support the Kiuchan steel complex, iron ore can be supplied from the Changkiachwan site on the west slopes of the Liupan Mountains. Coal for the Kiuchuan steel center will be supplied from the Shihtsuishan basin (on the upper Yellow River) and from the Shantan basin (200 kilometers east of Kiuchuan). Steel from the Kiuchuan plant will supply the industrial areas of Lanchow and Yumen.

Steel-smelting and rolling mills are under construction at Paoki and Sian, using pig iron from small local furnaces. The first section of the Sian plant is scheduled to start operations in 1959, the second in 1960. It will produce ordinary and special steels, medium-size and small rolled products and seamless tubing. About 130,000 tons of steel were produced in Sian in 1958. Paoki is building a plant making large-diameter pipe for the oil and gas industries and a small steel-smelting plant.

The August 1 Plant at Urumchi is to be expanded to a medium-size plant, and other medium-size and small plants are planned for Hami, Kashgar and Hotsing.

Four iron-ore deposits with total reserves of 3 to 5 billion tons have been found in the Golmo area on the southern margin of the Tsaidam basin and along the upper courses of the Hungshui and Nomu rivers. In addition large coal reserves have been found in the upper reaches of the Nomu River. A second steel center could thus rise in the Golmo area in the future, in addition to Kiuchuan, to supply Northwest China.

This concludes the discussion of the distribution of the iron and steel industry by administrative-economic regions. As far as the geographical aspect of the question is concerned, it should be noted that new construction within economic regions, provinces and even hsien displays a certain unevenness due to a whole series of geographical factors. New construction is being concentrated around raw-material sources and near economic centers and developed farm areas. Transportation is also a major factor. This process of concentration makes it possible even now to distinguish several clusters of the iron and steel industry. The most important still is the old industrial district of southern Manchuria centered at Anshan. Along the eastern foot

of the Taihang Mountains, new industrial centers are rapidly developing along the Peking-Canton railroad in the vicinity of iron-ore and coal deposits. These centers are Hantan, Shihkiachwang and Suanhua. Farther north are several older, now expanding steel plants at the southern foot of the Yen Shan (Shihkingshan, Tangshan). Then there is a series of clusters situated at points where the Yangtze River is intersected by north-south railroads. The Shanghai-Maanshan cluster is situated in the lower Yangtze valley. The Wuhan-Tayeh area, in the central Yangtze valley, also includes the future steel complex of western Hupei Province. In the upper Yangtze valley, favorable conditions for the development of the steel industry are found in southern Szechwan and northern Kweichow.

South of and parallel to the Yangtze River are a series of plants under construction along the Kiangsi iron-ore belt centered on Sinyu. These plants are situated at Lienyuan, Siangtan, Pingsiang, Sinyu, Nanchang, Tungsiang, Ichun, Kian and Shangjao, nearly all of which are on the Chekiang-Kiangsi-Hunan railroad. In addition to the clusters there are large isolated plants under construction or planned at Paotow and Kiuchuan.

Thus the former group of iron and steel centers is being supplemented by a new grouping situated along the middle Yellow River and the Yangtze River. The westward-moving iron and steel industry there forms a second line of strongpoints extending from Paotow in the north to Canton in the south. The links in that line are the iron and steel plants of Shansi and western Hopei, the plants in the Wuhan-Tayeh-West Hupei area, the projects in Hunan and western Kiangsi and the future steel complexes of Shiukwan and Canton. The Paotow-Canton zone contains a large part of the current construction projects of the iron and steel industry. The outlines of a third steel line are already becoming evident, cutting across the upper courses of the Yellow River and the Yangtze from north to south. That line will contain the two future steel giants of Kiuchuan and Sichang.

In conclusion it is evident that the Chinese steel industry is spreading westward and slightly southward from its old production centers. In the future that trend into the deep interior will become even more obvious as new plants now planned or under construction go into operation.

THE AMERICAN GEOGRAPHIC PERIODICAL LITERATURE

(Annals of the Association of American Geographers in 1958 - 59)

By I. M. Kuzina

Among the American journals devoted to economic geography, Annals of the Association of American Geographers and Economic Geography are of the greatest interest to Soviet readers. The Annals (founded in 1911) contain articles by geographers, who need not necessarily be members of the AAG, on various problems in economic geography and economic cartography, abstracts of papers read at the annual AAG meetings, occasional committee

reports and presidential addresses. It should be noted that the views expressed by the authors of articles do not necessarily represent the consensus of opinion of the AAG. The present editor of the journal is Walter M. Kollmorgen. The journal is published four times a year, each issue being about five to six printer's sheets in size (100 to 120 pages). The place of publication is Lawrence, Kansas.

The subject matter of each issue is quite diversified. In addition to articles dealing with general theoretical problems of economic geography and economic cartography, considerable attention is given to economic-geograhic studies of relatively small areas. In addition the journal contains surveys of foreign geographical literature and biographies of geographers. Finally a very interesting section is devoted to the abstracts of papers read at annual AAG meetings and covering a wide range of problems in physical and economic geography. Following is a brief survey of the Annals for 1958 and 1959.

Among the articles published in 1958, the reader's attention is drawn first to articles dealing with theoretical problems in economic geography based on county data. These articles include "Urban Impact on Agriculture in Santa Clara County, California" by Paul F. Griffin and Ronald L. Chatham and an article by Walter M. Kollmorgen and George F. Jenks on social types of farming in the United States. These articles show clearly on the basis of specific economic-geographic examples, perhaps independently of the wishes of the authors, the effect of the contradictions inherent in capitalist society between labor and capital, town and country, demand and consumption of farm products and between technological progress and reckless exploitation of nature.

Griffin and Chatham in their study note with concern the "dramatic" extension of urban uses to agricultural lands in California. They find the reasons of such a development in the growth of population, the development of industry (in California, mainly defense industry), the lack of planning and the difficult position of agriculture. The authors say that if that process continues unchecked with the same intensity all arable land in Santa Clara County will have been absorbed by urbanization in the next twelve years. The authors call for a national program of conservation of agricultural land, government acquisition of the best land, the creation of a soil bank and finally subsidies for farmers.

The articles written by Kollmorgen and Jenks are devoted to major current problems in American farming. In addition to rural farmers, the United States now distinguishes suitcase farmers, who live within 50 or more kilometers of the boundaries of the county in which their farm land is located, and sidewalk farmers, who live in cities and towns. On the basis of statistics, the authors present tables and maps and give a detailed description of the structure of the economy and the distribution of suitcase and sidewalk farmers, and also try to explain the reasons for such types of farming. The authors say that the appearance of suitcase farmers, whose numbers increased especially since 1948, on the one hand reflected the seasonal migrations of farm workers

but that, on the other hand, suitcase farmers are backed by the "big money" of oil monopolies and capitalists who got rich in wheat and livestock operations in World War II. Kollmorgen and Jenks note that 80 per cent of the land worked by suitcase farmers is absentee owned, i.e., owners who do not live in the given county. Suitcase farmers specialize in the monoculture of wheat and show a reckless attitude toward maintenance of soil fertility and preservation of the soil structure. The sidewalk farmers are also found in the wheat belt, but are more common in more westerly areas. The authors show that sidewalk farmers are most common in areas subject to significant crop fluctuations because of business crises, depressions and short-lived booms.

Among other studies of a theoretical character, attention is drawn to articles by William H. Wallace and Leonard Zobler. Wallace's article on "Railroad Traffic Densities and Patterns" is designed to examine two aspects of railroad traffic that have considerable significance to geography: general traffic density on railroads and traffic patterns determined by local variations in density and directions of flow. The author compares the traffic density of all railroad nations and lists seven factors affecting freight traffic densities. These factors include the level of development of extractive and heavy industries, the degree of population concentration, the level of technology, the standard of living, types of agricultural activity, the pattern of the rail net, and the degree of inter-carrier competition. In addition, Wallace lists six factors affecting the density of railroad passenger traffic (population density, distribution of population relative to railroads, the level of technology, the standard of living, the pattern of operations on the railroad system and the competition with other public carriers).The author holds that railroad traffic density reflects the economic activity of a region. The article also discusses regional rail nets and functional types of railroad lines. Wallace distinguishes eight types: trunk lines, two types of main lines, four types of branch lines,and isolated lines. The article analyzes the functions of three railroad systems: New Zealand, the Chicago and Northwestern System and East Africa (Kenya, Uganda and Tanganyika).

Zobler devoted his article to problems of regionalization, specifically the question of selecting regional boundaries. He gives his definition of regions as "areal systems based on levels of similarities and differences in spatially distributed traits," holding that "nonhomogeneous distribution of these features identifies the peculiar properties of respective regions" and "each spatial unit is internally homogeneous but differs from other members of the system." Zobler says that geographic boundaries are usually determined in three ways: (1) By means of traverses on which points are set at places where major differences in the magnitude of observed phenomena occur. The points are then connected. (2) By comparing and grouping statistical data collected for smaller units (counties, states). (3) By establishing a system of regions employing any continuously distributed phenomenon related to other traits in which the investigator is interested. Zobler proposes two statistical methods for studying regions and comparing them with one another: chi square and variance analysis.

It should be noted that the Annals devote much attention to theoretical studies and, in addition to major articles, include many briefer items in the section of "Letters and comments on Annals topics."However, most of the "purely" theoretical studies are far less interesting despite their thorough approach. For example, an article by Brian J. L. Berry and William L. Garrison, explaining urban rank-size relationships, attempts to derive mathematical formulas establishing the relationship between city sizes, on the one hand, and the total urban population and number of cities in the given area, on the other hand. And John W. Alexander in an article titled "Location of Manufacturing: Methods of Measurement" classifies existing mapping methods into five categories based on the ratio between the number of units of measurement and the number of study areas. Brian J. L. Berry of the University of Chicago devoted an article to the problem of distribution of business districts and shopping centers. In order to study business districts located in ribbons along arterial highways, he used a classification of business types proposed by other authors and distinguished four forms of distribution of business districts: nucleated shopping centers, urban arterial districts, highway-oriented facilities and automobile-row functional areas.

In 1958 and 1959 the Annals published several interesting economic-geographic studies about ports written by American authors with support from the Office of Naval Research. These studies included one by Donald J. Patton about the hinterlands of New York, Philadelphia, Baltimore and New Orleans. The author compared the operations of these ports and determined their share in United States imports and exports. Patton also listed the factors affecting the types of hinterlands he described, for example, freight tariffs, port organization, railroad connection (a major factor in port formation is the existence of a single port outlet for a major railroad), the degree of efficien cy in terminal operations, the structure of industry in the port, the support of commercial and financial organizations, and the existence of a market.

An article by Allan L. Rodgers was devoted to the external and internal relations of the port of Genoa. The Annals also published two articles by William A. Hance and Irene S. van Dongen from a series of articles dealing with land and sea transportation of Central Africa, prepared at Columbia University under contract with the Office of Naval Research. The Hance-van Dongen articles deal with the port of Matadi, center of Belgian-African trade on the Congo River, and the port of Dar es Salaam and its hinterland. All these articles are accompanied by many original maps, tables and photographs. The authors concentrate their attention on links between the ports, their hinterlands and their overseas connections.

In 1959 the journal published several articles devoted to the geography of the USSR. They include studies by Paul E. Lydolph, acquainting the American reader with Fedorov's complex method in climatology; by W. A. Douglas Jackson, about the wheat base in the non-chernozem zone of European Russia, and by David J. M. Hooson, about recent changes in the

content and theory of Soviet geography. Although Soviet readers may not agree with some of the statements in those articles, the fact of their publication demonstrates the growing interest in the United States for the geography and geographers of the USSR.

Among articles devoted to the history of geographic ideas is one by Richard Hartshorne titled "The Concept of Geography as a Science of Space, from Kant and Humboldt to Hettner."

The issues of the Annals under review contain biographical articles about leading American and foreign geographers, including Hsia-ke Hsu, the Chinese geographer and traveler, who lived 1586-1641; John Muir, the American traveler and geomorphologist; Joseph Kincer, the American climatologist; Armin Lobeck, the geomorphologist, and others.

Of undoubted interest for the geographer are the Annals review articles, including Richard S. Thoman's article on recent methodological contributions to German economic geography; Alexander Melamid's study of economic developments in the Middle East; Bert F. Hoselitz' article on the cities of India and their problems as well as William L. Garrison's article on the spatial structure of the economy. This article surveys the main studies on the theory of location published in recent years by Walter Isard, Edgar S. Dunn Jr., Claude Ponsard, Melvin L. Greenhut, August Lösch, Olaf Boustedt and Herbert Ranz.

The journal also contains several studies on geomorphology, climatology, cartography and ethnography, but these are relatively few compared with the ones on economic-geographic subjects. Among the studies in physical geography are one by Jen-hu Chang on "Zonal Indices as Related to the Winter Climate in East Asia," a joint work of several authors (H. A. C. Neuburg and others) on the Filchner Ice Shelf in Antarctica, and an article by Herold J. Wiens on atolls of the Pacific Ocean.

Finally the Annals supply the abstracts of papers read at the 54th and 55th annual meetings of the AAG.

The 54th meeting, which took place in Los Angeles in August 1958, included a rather large number of papers -- 134. The papers' topics in physical, economic and political geography and in cartography are very diversified and pertain to the United States (one-third of the total) and to many countries of Asia, America, Africa and Europe. It should be noted that four papers were devoted to the USSR (David J. M. Hooson "Some Recent Developments in the Content and Theory of Soviet Geography," W. A. Douglas Jackson "Wheat in the North: Soviet Experience in the Non-Chernozem Zone of European Russia," Theodore Shabad "Locational Factors in the Soviet Aluminum Industry," and Bogdan Zaborski "Rural Settlements of the Western Fringe of the Soviet Union." It is noteworthy that among foreign areas most of the attention was focused on the underdeveloped countries of America and Asia.

The papers displayed a heavy predominance of economic-geography topics (83 papers), especially those devoted to sectors of industry, urban and population geography and agricultural geography.

Among the papers on urban and population geography were John Fraser Hart's "Negro Migration in the United States," Duane F. Marble and John D. Nystuen's "Commercial Geography of Urban Areas and the Movement of Persons," and Allen K. Philbrick's "Composite Urban Hinterlands."

Many interesting papers were devoted to agriculture, especially the land-use problem. We might cite Rodney Steiner's "Some Sampling of Rural Land-Uses," S. Van Valkenburg's "The Standard of Land Use Within the European Common Market," and Clyde E. Browning's "Selected Relationships of Land Use and Distance from the City Center Within the Chicago Area." Several authors discussed farming in under-developed countries (Yemen, Iraq, Malaya). Of interest is Leonard Zobler's paper on "Comparative Evaluation of Food Resources by International Acre Equivalents."

Among the industrial studies were Nathaniel B. Guyol's paper on the importance of nuclear fuels in world energy supplies, Elbert E. Miller's discussion of some aspects of uranium geography, and Thomas Barton's paper on the industry of Thailand.

Among the papers dealing with integrated geographic topics were both concrete and theoretical discussions. The former included Andrew W. Wilson's "Recent Changes in the Population and Economy of the Mountain States" and Frederick L. Wernstedt's "Climatic Fluctuation and Agriculture in the Great Basin, 1931-56." Theoretical papers were presented by P. L. Wagner "On Classifying Economies," Richard Hartshorne "What Do We Mean by 'Region'?", Harold H. McCarty "The General Content of Economic Geography," and Joseph Sonnenfeld "Implement Geography as Geographic Synthesis."

Some papers were devoted to political and military geography, Outstanding against the general background of scientific papers at the meeting was the "study" by James M. Hunter on "Geodiplomacy and the Eisenhower Doctrine," trying to justify and to give a "scientific" basis to the government's policy.

In the general field of physical geography, including geomorphology, climatology, soil geography and biogeography, we find about 30 papers, including Yi-Fu Tuan "Soil Evolution and Land Form Development," George C. DeLong "Temperature Changes in Northeastern United States, 1906-55," and William C. Robison's "A Geographical Approach to Plant Geography."

There was also great diversity in the work of the cartographers. Arnold J. Kreisman devoted his paper to the compilation of small-scale multi-purpose maps. Pradyumna P. Karan told of a new map of the manufacturing regions

of India, and Arch C. Gerlach discussed linguistic maps.

The 55th annual meeting of the AAG took place in March 1959 at Pittsburgh. A total of 143 papers were given. As at the previous meeting, the topics were very diversified. Economic geography of the United States again was a dominant topic among the papers. A new aspect was the greater number of papers concerned with theoretical problems or the status of geography in various countries. The latter included Josip Roglic's "Geographic Thought in Yugoslavia," Chiao-min Hsieh's "Geography in Communist China," and Hans H. Carol's "Current Geographic Thought in the German Language Area." The category of theoretical papers was broader. It included Charles T. Stewart Jr.'s "The Hinterland Reconsidered," Frank H. Thomas' "The Capture Ratio -- A Measure of the Relationship Between the Railroad and its Region," and several papers dealing with theoretical questions of urban and population geography (Edward J. Taaffe "The Urban Hierarchy and the Gravity Model: An Empirical Definition," Wilbur Zelinsky "Industrial Dispersion of American Cities"). Also of interest were studies of a more general nature such as Brian J. L. Berry's "Statistical Tests of Value in Grouping Geographic Phenomena," Preston E. James' "Concepts Derived From the Study of World Geography in the Secondary Schools," and Louis A. Wolfanger's "Some New Horizons in Soil Conservation and Land Use."

Compared with the previous meeting, there were more papers dealing with countries of the Socialist camp: three papers were devoted to the USSR (Paul E. Lydolph and Theodore Shabad "Soviet Oil and Gas: Recent Exploitation and Utilization," David J. M. Hooson "The Middle Volga -- an Emerging Focal Region in the Soviet Union," and Fred E. Dohrs "Changing Land-Use Patterns in the Central Ukraine); two to Poland (Huey Louis Kostanick on population patterns and Antoni Kuklinski on industrial geography), and finally George W. Hoffman's paper on "regional integration and cooperation in Eastern Europe," naturally from the point of view of the State Department.

American geographers also devoted greater attention to political geography. We might cite the papers by Vincent H. Malmström on the "beneficial" impact of the American military base on Iceland's economy, Alexander Melamid on the partition of Cyprus and James M. Hunter "Parallel Ideas of Ratzel and Hartshorne in the Methodology of Political Geography."

In economic geography attention was focused on urban geography and population geography. The following papers may be listed: Roland J. Fuchs' "Intra-Urban Variation of Residential Quality," based on cities of the United States; Lawrence A. Hoffman's "Dynamics of Population and Resource Development," Peter H. Nash' "Interdisciplinary Approaches to the Study of Emerging Polynuclear Metropolitan Regions," Jerome P. Pickard's "Functional Size and Regional Location of Major Metropolitan Areas of the United States in 1956; and Sister Mary Ursula's "Changing Patterns of Catholic Population in Eastern United States."

Equal attention was given to the geography of industry and agriculture. We might cite Charles W. Boas' paper on the distribution of American automobile-assembly plants in 1895-1958, Lloyd D. Black's study of President Eisenhower's rural development program, Robert B. McNee's "Centrifugal-Centripetal Forces in International Petroleum Company Regions," based on a case study of Standard Oil (N. J.), and a whole series of papers on the geography of industry or agriculture in small areas of the United States and in other countries. Several papers were devoted to the state of Pennsylvania (George F. Deasy, Phyllis R. Griess, Henry Madison Kendall and Gerald J. Karaska).

A smaller number of papers, but of no less interest, was given in transportation geography: Albert G. Ballert (on transportation and overseas links of the Great Lakes), Thomas Frank Barton (on the largest railway net in Southeast Asia, centered on Bangkok), Richard E. Carter ("A Comparative Analysis of United States Ports") and Robert E. Gensler ("The Suez Canal and Middle East Oil").

As at the previous meeting, many papers were devoted to the geography of backward and under-developed countries of South America, Asia and Africa. Among the papers on Europe, we might cite Jack Richard Villmow's "Regional Contrasts Within Berlin".

Among the physical geographers there was an increase in topics relating to the International Geophysical Year and Arctic and Antarctic studies. Many interesting papers were read in climatology (Henry J. Warman on the effects of urbanization on diurnal temperatures, Richard Hartshorne's "A Rational and Elementary Classification of Climates", Sigmund J. Falkowski on climatic data for the Northern Hemisphere, and James A. Shear's "Some Observations on Antarctic Circulation). Other papers were devoted to paleogeography, biogeography, geomorphology, hydrology, physical geography and cartography.

It is of course difficult to assess the depth and correctness of any given paper merely on the basis of abstracts published in the Annals, but such publication is nevertheless of great interest. Some of the papers read at the AAG meetings have been published in American geographic journals, including the Annals.

In concluding this review of the journal, it can be said that the Annals, by acquainting readers with original studies of American geographers, are of unquestionable use not only to persons working on the geography of foreign countries but also to those geographers who study the USSR.

NEWS NOTES

By Theodore Shabad

Administration of Northern Kazakhstan. Further evidence has come to light regarding the special administration of the Russian-settled wheat lands of northern Kazakhstan, whose economy differs markedly from the rest of the republic. The announcement of the establishment of a special Farm Ministry for northern Kazakhstan is followed by the disclosure that the Central Committee of the Kazakhstan Communist party contains a special office (byuro) dealing with the affairs of the northern oblasts (See Soviet Geography, April 1960, p. 86).

Nazarovo Power Plant. The first 150,000-kw. turbine of the 1,200,000 kw thermal power station at Nazarovo in southern Siberia was scheduled to start generating power in the third quarter of 1960. The Nazarovo station, situated south of Achinsk at the junction of the Achinsk-Abakan railroad and the Chulym River, will use 4.5 million tons of coal when generating power at full capacity. The coal is mined at low cost in a local strip mine. Construction on the power station began in 1955. It is expected to supply power to the Achinsk alumina and Krasnoyarsk aluminum plants pending completion of the Krasnoyarsk hydroelectric station on the Yenisey River about 1965.

Bashkir Sugar-Beet Expansion. The Bashkir sugar-beet area along the Belaya River between Ufa and Sterlitamak has been expanded fivefold in recent years, rising from 10,000 hectares in the early 1950's to 50,000 hectares in 1960. The beets are processed at refineries at Meleuz, south of Sterlitamak, and Chishmy, west of Ufa.

Ryazan' Plant Gets Electric Steel Furnace. The hydraulic forging-press plant at Ryazan', situated in a new industrial area 10 kilometers southeast of Ryazan', has acquired its own electric steel furnace. With the planned completion of a second furnace, the plant will be able to supply its own steel castings. In addition to forging presses, the new Ryazan' industrial district also manufactures heavy machine tools and calculating machines. A rayon plant using the viscose process began operations there in May 1960 (Soviet Geography, June 1960, p. 76). An oil refinery to process Tatar crude is under construction. The population of Ryazan' rose from 136,000 (1956 estimate) to 213,000 (1959 census).

Cherepovets Rolling Mill Opens. The "1700" mill, expected to become a major supplier of sheet steel for the automobile industry, was opened in June 1960 in the iron and steel plant of Cherepovets in northern European Russia. After the completion of two more rolling mills, the "700" and the "250", the integration of the plant will be fully achieved. The Cherepovets plant is based on 60 per cent iron concentrate from Olenegorsk in the Kola Peninsula and on coking coal from Vorkuta. Its principal markets are the machine-building industries of Leningrad and of the Central Industrial Region around Moscow. Ground for the steel mill was broken in 1949, the first blast

furnace started production in 1958. The population of Cherepovets increased from 32,000 in 1939 to 92,000 in 1959.

Krasnodar Kray Gas Production. Krasnodar Kray in the Northern Caucasus is rapidly becoming one of the Soviet Union's leading natural gas producers. Output, beginning in the mid-1950's, reached 1 billion cubic meters a year in 1957, 1.3 billion in 1958 and 2.76 billion in 1959. Krasnodar is expected to pass Stavropol' in gas production in the first half of 1961. Stavropol' Kray, which also began large-scale gas production in the mid-1950's, yielded 4.3 billion cubic meters in 1958. Both the Krasnodar and the Stavropol' fields are linked by 820-mm and 1020-mm pipelines with Moscow.

Groznyy Gas Line Opens. A natural-gas pipeline from the Achaluki gas and oil field to Groznyy has been completed. The Achaluki field, situated about 50 miles west of Groznyy in the Sundzha hills, was discovered in 1957. Its oil output has halted the previous decline in production of the Groznyy area. The new gas line supplies fuel to the Novo-Groznyy Heat and Power Plant, one of the largest in the Northern Caucasus.

Kazakhstan Raises Iron-Ore Goal. The seven-year plan of iron-ore production in Kazakhstan has been increased over original levels. The Rudnyy iron-ore complex in Kustanay Oblast, designed to supply the Magnitogorsk, Chelyabinsk and other steel mills of the Urals, is now expected to produce 26.5 million tons of dressed ore by 1965 instead of the earlier plan of 19 million tons. The Karazhal iron mine, which is to supply the Karaganda iron and steel mill, is expected to produce about 4 million tons of ore by 1965, making a total Kazakhstan goal of more than 30 million tons. Iron-ore production in 1959 was 3.2 million tons, nearly all of which came from Rudnyy.

Mining Center Opens In Kursk Magnetic Anomaly. The first iron ore was shipped in June 1960 from the new mining town of Zheleznogorsk at the Mikhaylovka deposit, 60 miles northwest of Kursk. Zheleznogorsk is the second mining center of the Kursk Magnetic Anomaly to start operations, the mines of Gubkin having been in production earlier (see Soviet Geography, June 1960, p. 77). The Zheleznogorsk deposit consists of 500 million tons of 54-to-56 per cent iron ore, accessible in surface mines, and about 10 billion tons of iron quartzites (37 to 40 per cent iron). The first section of the Zheleznogorsk project has a capacity of 2.5 million tons of high-grade ore. Completion of the second section, planned for 1964, will raise the capacity to 4.5 million tons a year. Construction on the site began in 1957. Transportation to the Tula and Lipetsk steel mills is insured by a 42-kilometer spur from Arbuzovo (on the L'gov-Bryansk railroad) to Zheleznogorsk.

Lipetsk Iron and Steel Mill Expands. A cold rolling mill for the production of electrical sheet steel was opened in June 1960 at the Novo-Lipetsk plant as part of the current program of expansion and integration.

The Novo-Lipetsk plant already has blast furnaces, electric steel furnaces and a hot rolling mill. Open-hearth furnaces are to be added. The expansion program, begun in 1959, is designed to make the plant the largest in central European Russia, equal in steel capacity to Magnitogorsk (about 6 million tons). Novo-Lipetsk's steel output in 1958 was about 300,000 tons. Pig-iron production will be based on the high-grade ore from the Kursk Magnetic Anomaly (Gubkin, Zheleznogorsk). The rolling mills will specialize in electrical and other types of sheet steel and welded pipe. In addition to the Novo-Lipetsk plant, Lipetsk has an older iron mill, the Svobodnyy Sokol (Free Falcon), producing pig iron and iron pipe (by the centrifugal casting process).

Economic Coordinating Councils Set Up. A Russian Economic Council was established in June 1960 to coordinate the work of the 67 regional economic councils (sovnarkhozes) within the RSFSR. These regional councils, responsible for the management of industry and construction within their respective economic-administrative regions, were set up in 1957 to replace central industrial ministries. A Kazakhstan Economic Council has also been established to coordinate the work of the nine regional councils in Kazakhstan. Similar coordinating councils are expected to be organized in the Ukraine and Uzbekistan. The other Soviet union republics consist of one economic council each.

Long-Term Electric Power Goals. According to the long-range economic development plan now being drafted, Soviet electric generating capacity is expected to rise from 53 million kilowatts in 1958, to 121 million in 1965, 190 million in 1970, 300 million in 1975 and 480 million in 1980. Power production is scheduled to increase from 233 billion kilowatt-hours in 1958 to 2,300-2,600 billion in 1980. The original seven-year plan goal for 1965 has now been raised from 520 to 550 billion kilowatt-hours. Among power consumers, the share of industry is expected to drop from 69 per cent in 1958 to 60 per cent in 1980 while the share of agriculture and home uses will rise from 13.8 to 23 per cent. The power-output share of the eastern regions (Urals, Siberia, Central Asia) is expected to rise from 19.5 per cent in 1958 to 44 per cent in 1980.

A Transcaucasian conference on long-range electric-power goals was held in Tbilisi in June 1960. Papers were read on the electric-power prospects of Georgia, Armenia and Azerbaydzhan during the period 1960-80.

Conference on the Economy of Perm' Oblast. The prospects of economic development of Perm' Oblast were discussed at a conference held in June 1960 at Perm' under the auspices of the Urals Branch of the Academy of Sciences USSR and the Perm' Regional Economic Council. About 4,000 persons attended. K. Galanshin, First Secretary of the Perm' Oblast party organization, spoke on the prospects of economic development of the oblast for the next 15 to 20 years, stressing electric power, the Pechora-Kama diversion project and expansion of the chemical and steel industries. V. Tiunov, rector of Perm' University, discussed the natural resources of

Perm' Oblast, and N. Demenev, president of the Urals Branch of the Academy of Sciences, dealt with the prospects of industrial development.

Paper Production Goal Raised. A Soviet decree in June 1960 raised the seven-year plan goals of paper production from the original 3.53 million tons to 4.15 million tons by 1965, paperboard from 2.8 million to 3.6 million tons and pulp from 4.8 million to 6.18 million tons. Emphasis is placed on newsprint production, which is to increase from 389,000 tons in 1958 to about 1 million tons in 1965. Newsprint capacity is to be expanded by 2.5 to 3 times at the Pravdinsk and Borovsk (Solikamsk) mills and by 5 times at the Kondopoga mill. In the paperboard field, stress is put on increases in boxboard to replace wooden boxes and saving about 30 million cubic meters of wood a year. Sixteen pulp and paperboard mills are to be built, of which the mills at Bratsk, Komsomol'sk, Kotlas, Arkhangel'sk, Syktyvkar, Serov and Selenga are to have daily capacities of 800 to 1,300 tons of boxboard. New paperboard mills planned in Tula, Leningrad, Rostov and Novosibirsk oblasts are to use waste paper as raw material. In pulp production, most of the planned capacity is expected to use the more advanced sulphate and semi-chemical processes rather than the ordinary sulphite process.

Irrigation Canal in Southern Ukraine. The first section (80 kilometers) of the Krasnoznamenka Canal was opened in June 1960 in the dry steppe of Kherson Oblast between the lower reaches of the Dnieper River and the Black Sea. The Krasnoznamenka Canal, 10 to 20 feet deep, begins near Novaya Kakhovka in the Kakhovka Reservoir on the Dnieper, where the canal's intake capacity is almost 400 cubic meters per second. The canal flows about 64 kilometers south to Kalanchak, then turns west past Primorskoye to Krasnoznamenka, 55 kilometers southwest of Kherson. The total length of the canal will be 163 kilometers. The Krasnoznamenka Canal will irrigate about 60,000 hectares of what is now winter wheat land. First planned in 1950 as part of Stalin's great irrigation projects, work on the canal actually got under way in 1956.

Siberian Diamond Field Gets Electric Power. A 231-km. power-transmission line has been completed from the town of Mukhtuya on the Lena River to the Yakut diamond center of Mirny. Power is fed into the line from a movable power-generating unit at Mukhtuya. This will be Mirny's primary power source pending construction of the Vilyuy hydroelectric station in the coming years.

Fergana Valley Gas Line Opens. A 32-km. gas line has been completed from the small natural-gas field of Severnyy Sokh to the city of Kokand.

Belorussian Potash Site is Reached. Mine excavations have reached the potash deposit under development at the new Belorussian town of Soligorsk (formerly called Chizhevichi) near Starobin. The Potash layer has been reached at a depth of 425 meters. Soligorsk will supplement the production of Berezniki in the Urals and of Stebnik in the Carpathians. The primary market area for Soligorsk potash is Belorussia, the Baltic republics and the nearby oblasts of the Ukraine and the RSFSR.

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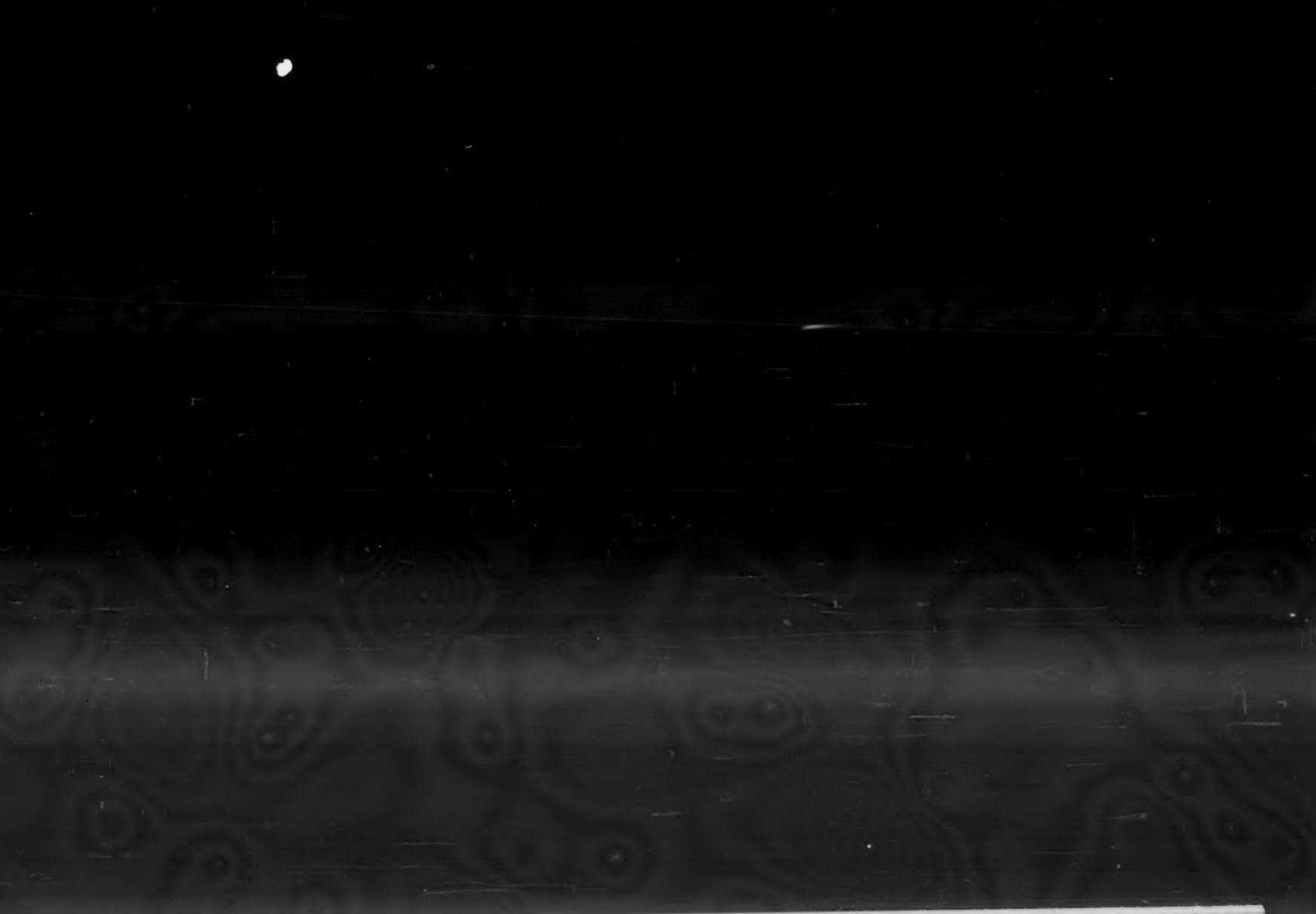
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